The Tool Engineer

Vol. [illegible] No. 6.
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1950

THIS ISSUE

Tool Engineers Trek to Detroit
See Page 9

[illegible] Is Wrong With Tool Design?
See Page 15

Fundamentals of Tool and Fixture Design
See Page 18

Temperature Control
See Page 24

ASTE

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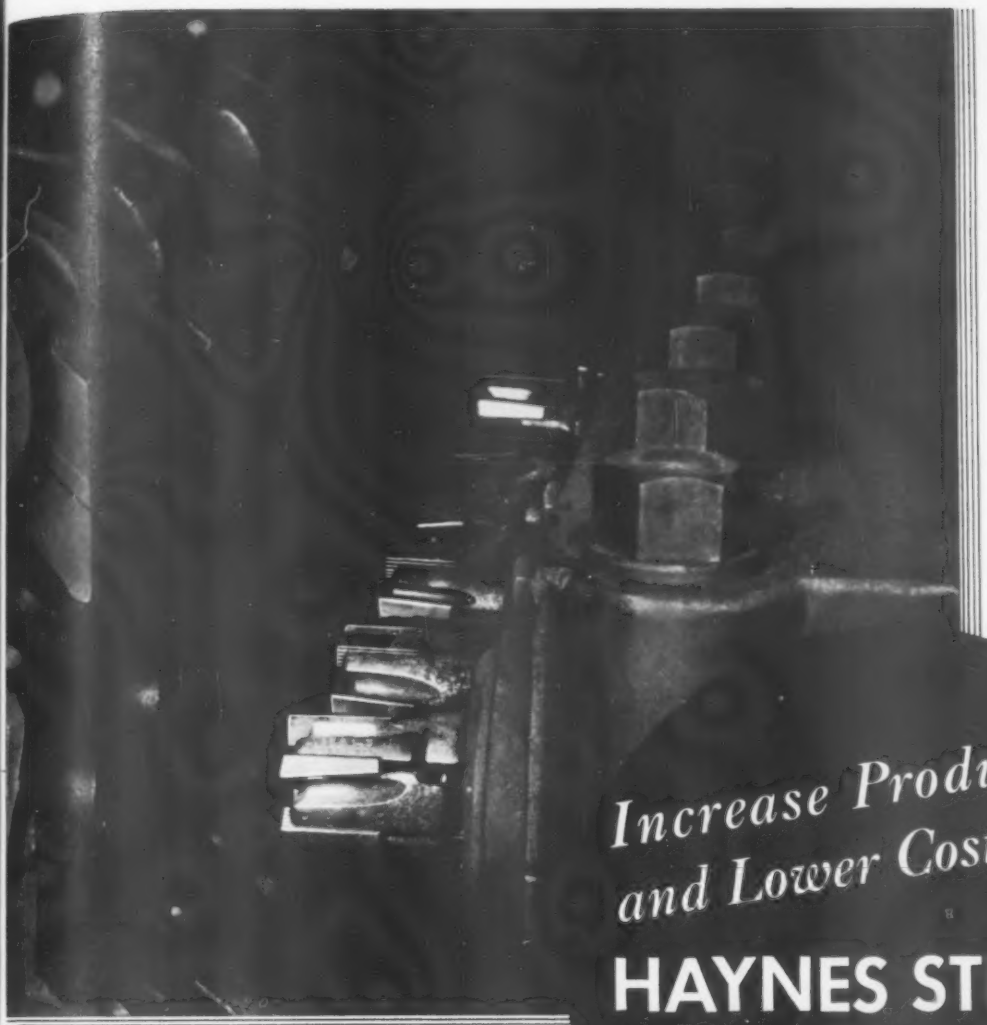

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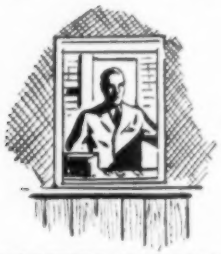

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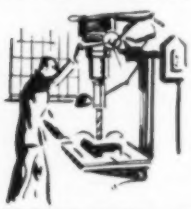

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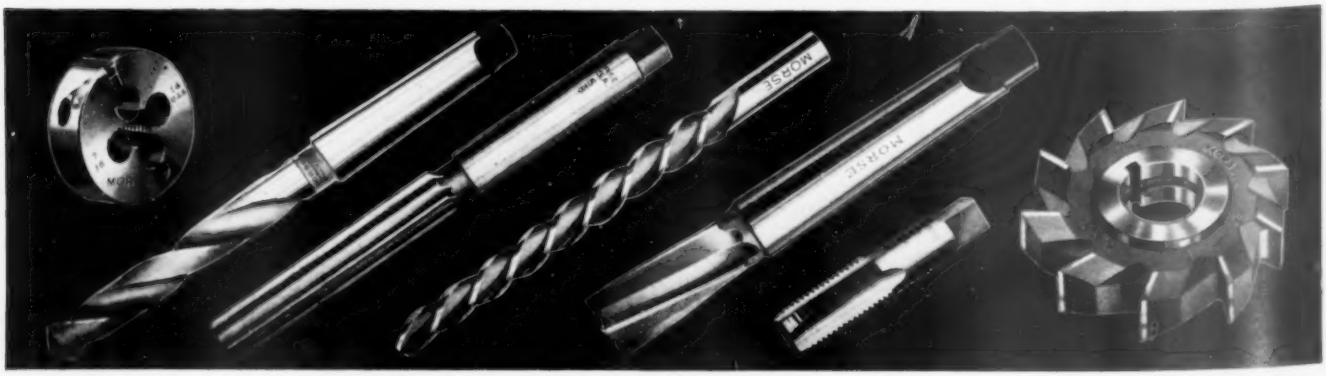

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CONTENTS
This Issue

Page

NEWS

Production Perspectives—News of Mass Manufacturing from Everywhere 10

TECHNICAL

What Is Wrong With Tool Design? By A. E. Rylander 11

Fundamentals of Tool and Fixture Design, By Charles J. Martin 12

Temperature Control, By R. A. Holt 18

New Equipment 17

A.S.T.E.

Semi-Annual Meeting in Detroit, October 8th, 1936 9

Chapter Meetings 22

A.S.T.E. Chapter Notes 15

Psychology for Tool Engineers 24

FEATURES

Letters 17

Handy Andy's Workshop 16

This Month's Cover 26

INDEX OF ADVERTISERS 38

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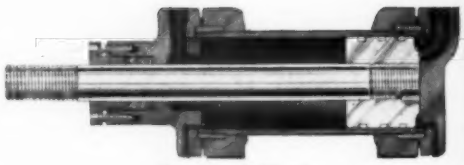

Sectional View

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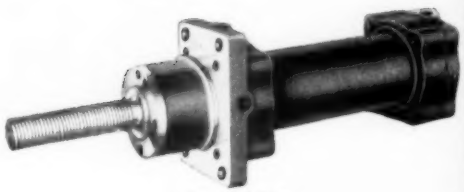

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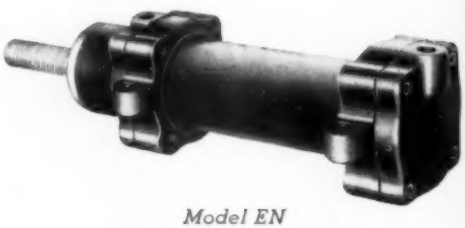

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NATIONAL MEETING

Detroit, Michigan

OCTOBER 8, 1936

● The October meeting, in Detroit, will be an outstanding event in A.S.T.E. history. While Detroit Chapter will be host to other chapters at the dinner and evening session, the meeting as a whole will be national in scope. "All roads should lead to Detroit" that date, as far as Tool Engineers are concerned.

● Every Detroit member is urged to cooperate to the fullest success for this meeting, but we particularly urge that the several chapters send as many representatives and delegates as possible. Matters of vital importance to the National Society are to be discussed.

● A very broad program has been arranged, but split up into periods starting at 10 A.M., at Hotel Fort Shelby when registration, introductions and committee appointments take place. Then, at 1 P. M., after an informal luncheon, reports—as financial and secretary's reports, discussions and work among committees. The counting of ballots and certification of Directors will take place, while various committees, such as Membership, Publicity, etc., will convene to decede on future plans.

● The evening meeting promises to be especially lively, and will be held at Fort Shelby Hotel, in the Spanish Grill. Starting with dinner at 6:30, there will be entertainment, a movie—a very fascinating movie—"Men and Machines" which unmistakablly refutes the repeated charge that machines reduce jobs. You will want to see this. In addition, we are promised a speaker of national reputation. Just who, we cannot say at this time, but you won't want to miss what he has to say.

● As many members as possible should attend the dinner, both for their own benefit as well as an act of courtesy to our guests. A large attendance at the technical session at 8 P. M. is particularly desired and anticipated. October 8th will be a banner event. Reserve that date—October 8th—as A.S.T.E. night.

Announcements of other A.S.T.E. Meetings, to be held in October, will be found on page 22.

PRODUCTION PERSPECTIVES

News of Mass Manufacturing From Everywhere

Mass manufacturing plants throughout the country have continued their high volume of production, with one exception—Detroit area still shows a letdown pending 1937 production, which however, is expected to get under way not later than the middle of this month. Mass production plants of New England, Middle Atlantic states, Cleveland and Cincinnati districts, Chicago, Milwaukee, and other points have failed to show any appreciable summer slump.

Western Massachusetts district shows about a 5% increase in employment with an 8 6/10% increase in wages. From New Kensington, Pa., we hear that the Aluminum Company of America has added approximately $400,000 a year to the pay roll for 20,000 workers in the New Kensington district, a 5% increase in wages for all employees of the company, which became effective September 16th. From La Crosse, Wisconsin, we hear that plans were announced recently for a return to a three shift, 24-hour continuous operation schedule with an increased personnel to be effective November 15th, for the La Crosse plant of the Allis-Chalmers Manufacturing Company. This plant, which manufactures agricultural implements, has been employing about 500 men on a two-shift basis according to manager, Fred J. Papenfuss.

At Milwaukee work was resumed Sept. 17th at the Seaman Body Company following a one-day "sitdown" strike in the frame department that tied up the huge works on September 16th.

A score of delegates to the World Power Conference at Washington, representing England, Germany, Roumania and Chile, toured Cleveland industrial plants September 17th. Other cities included on their tour were New York, Pittsburgh, Niagara Falls, and Philadelphia. At Cleveland the delegates visited the White Motor Company and the Cleveland Tractor Company among other plants.

Connecticut's industrial production picture shows a sharp reversal of trend in the fact that payroll figures for Bridgeport and Hartford rose in August above the July figure. Ordinarily a seasonal low point, **August provided a marked surprise** for observers, **with payrolls not only exceeding the previous month but rivalling the peak figures of 1929**. Bridgeport's average weekly payroll for August, as revealed by the Chamber of Commerce, was $1,015,082, a gain of 1.11 over July and 4.70 over August, 1935. Hartford County factories added 851 employes during August, bringing the total number of hands to 53,210. Factory payrolls in Norwalk for July averaged $183,026 weekly, as against $150,778 in July of last year. July figures for Meriden and Wallingford showed slight declines in comparison with last year, reflecting conditions in the silverware manufacturing field. August figures are not yet available for the three communities last mentioned . . . . . Wage increases of five per cent have been announced by **Aluminum Co. of America**, Fairfield; **Bridgeport Brass Co.**, Bridgeport; **Chase Brass & Copper Co.**, Waterbury; **American Brass Co.**, Waterbury, Ansonia and Torrington; **Plume & Atwood Mfg. Co.**, Thomaston, and other manufacturers . . . . . **Scovill Mfg. Co.**, Waterbury, has cut its work week from 45 to 40 hours and will allow time and one-half for more than eight hours per day, thus complying with new federal legislation. . . . . About 1,300 employes of the **Bryant Electric Co.**, Bridgeport, received 14 per cent more than their regular monthly earnings for August under the company's new excess earnings bonus plan. . . . . **Shoe Hardware Co.**, Waterbury, and **E. Ingraham Co.**, Bristol, are recent additions to the list of Connecticut manufacturers giving vacations with pay to employes with the company five years or more. . . . . Dividends are being distributed on a handsome scale, reflecting steady improvement in production. Regular and extra dividends of 50 cents each have been voted by directors of the **Bristol Brass Corp.** . . . . . A quarterly payment of 30 cents has gone to stockholders of **Eastern Malleable Iron Co.**, Naugatuck, while **Bridgeport Brass Co.** has declared a regular of 10 cents and an extra of 15 cents, and **Scovill Mfg. Co.** voted 75 cents compared with the normal rate of 25 cents. **Bridgeport Brass**, by the way, has bought more property for expansion purposes, supplementing a large purchase a few weeks ago. . . . . A quarterly dividend of 10 cents a share goes to stockholders of **Pitney-Bowes Postage Meter Co.**, Stamford, now erecting a $90,000 addition to its plant. . . . . **North & Judd Mfg. Co.**, New Britain, had net profit of $245,648.30 for the fiscal year ended June 30. . . . . **Peck, Stow & Wilcox Co.**, Southington, reports sales for the past year were nearly 50 per cent ahead of the preceding 12 months, with the machine division recording an increase of 100 per cent and showing its first profit in a number of years. . . . . **Yale & Town Mfg. Co.**, Stamford, reports for its June quarter net profit of $238,232, or 49 cents a share. . . . . Net profit of **Bullard Co.**, Bridgeport, for the first half of 1936 amounted to $340,638, equal to $1.23 a share, compared with $31,966, or 11 cents a share, for the same period in 1935. **Bullard's** present operations are confined largely to the production of high speed automatic machines such as **Multi-Au-Matics, Contin-U-Matics** and vertical turret lathes, and markets on a royalty basis a new patented process for metal cleaning and scaling by electro-chemical means. . . . . **General Electric Co.**, Bridgeport, has purchased 11 acres of land, with buildings containing 324,000 square feet of floor area, from the **Remington Arms Co.**. The buildings and space will be used for future expansion. . . . . **Waterbury Rolling Mills, Inc.**, Waterbury, producing nickel silver, phosphor bronze and other alloys in sheets and rolls, is marking its 30th anniversary this year, with production showing steady gains. . . . . Edward H. MacCoul has resigned as general superintendent of the **Seth Thomas Clock Co.**, Thomaston, where employes have just returned to work after a strike against inauguration of a piecework system. . . . . Charles W.

(Continued on page 36)

What Is Wrong With TOOL DESIGN?

By **A. E. Rylander**
Member A. S. T. E.

(Conclusion)

ONE of the biggest "wrongs" with tool design is *time*. By that I mean that too little time is allotted to thinking out a tool. "Spread lead!" Unfortunately, we are yet in the dark ages when a tool designer is considered an expense man, rather than an originator of tools for mass production. Management rather ignores the fact that a jig or fixture, even if comparatively cheap, must stand the gaff of a period of intensive production, also, that tool charges are but a small fraction of cost of production. An inferior tool may entail prohibitive production costs, whereas one carefully and analytically designed may be cheap at any price since it cuts production expense to a minimum.

One trouble is that the man—or men—best qualified to conceive and design tools are too rushed. There is too much demand on their services. All too often, their ideas and layouts are taken from them and turned over to a draftsman when only sketchily outlined. And the draftsman, while he may be an artist in his line, may be anything but a designer. There is a whale of a difference between the two, as much as between a chef and a short order cook.

It rarely happens that a good designer and a good draftsman are embodied in the same individual. Their concepts are different; the designer visualizes the tool and its place in the production scheme, while the draftsman is apt to consider the drawing itself as the ultimate. This does not imply that the good designer cannot make a good drawing, rather, he considers the drawing as an instruction sheet, as such a means to an end, not an end in itself.

The time element is not properly allotted. Actually, the time required to *draw* the design should be subordinated to the time to think it out. The concept outlined, the drawing should then be executed clearly but not fussily, with more attention to the information conveyed in lines and notes than to the less important items of delineation and lettering. However, details should be *drawn*, not sketched. In this connection, comparatively few draftsmen are competent to execute a clear sketch. They cannot see the imaginary object, nor is there any object in free hand sketches since a fast man, with instruments, can do the job *right* in about the same time. Besides, drawings reduce confusion and make easier checking.

Another "wrong" with tool design is that drawings are not made clear enough. Often, they are too mechanical, too precise. The result is a confusion of lines rather than a clear picture of what is wanted. The draftsman will "project" where an out-of-plane section would be clear and understandable, hence, in conventional drawings the less important details are often stressed to the sacrifice of the more important. A tool drawing should be delivered to the tool room so that its principles are apparent at a glance. Perhaps no drawing so clearly illustrates a tool as the *isometric*. Why this compromise with perspective is not more universally used is a puzzle. Isometrics are easily drawn, once the little tricks are mastered, and as easily read. They convey a *picture*, not a confusion of lines, and in many instances one view will suffice.

Perhaps the greatest trouble with tool design is a dearth of men actually capable of designing. For designing, as apart from mechanical drawing, requires not only that the designer be well grounded in mechanics and the laws of mechanics, but that he knows how to apply them. For best results, he should also be a mechanic. He should know the practical application and use of tools, the machinery and equipment with which they are to be used, also, he should be well grounded in manufacturing methods. That is where practical shop experience is invaluable. Having these requisites, it is equally important that the designer can put his ideas down on paper. But there again we have the element of time; he should have time enough to *think it out*. Spread the lead when the idea is right, not before.

Yet another wrong with tool design is not so much the tool as the part to be tooled. Oftener than should be the case parts are so designed that tooling is not only difficult but production and accuracy are sacrificed. I know, personally, of several instances (20 years or more ago) when whole machines were redesigned to facilitate tooling, yet that idea has lain dormant in the middle west until recently, when one of our larger automotive concerns revived the idea. They will find that it pays. Before a part is to be tooled, it should first be submitted to a process engineer for revisions which will effect easier tooling. Obviously, such redesign should not sacrifice the product; if anything, it should *improve* it.

Everything considered, the tools—even if only used for a seasonal output—are every bit as important as the mechanical equipment. Without the right jigs, fixtures and small tools, the costliest machine would be just a white elephant. And, as previously stated, the design of tools requires an inventive ability comparable to the design of an intricate machine. Many tools are small machines in themselves, with the added disadvantage that correct proportions are often impossible of attainment, due to the shape of the part to be machined. In such cases a compromise must be resorted to which taxes the ingenuity of the designer.

Of course, it must be considered that I have taken the negative side of a question, being fully aware of the progress in Tool Engineering. Nevertheless, I

(Continued on page 24.)

Fundamentals of Tool

By Charles J. Martin

Production Engineer, Ex-Cell-O Aircraft & Tool Corp., Detroit. As given before Detroit Chapter meeting of the American Society of Tool Engineers, September 10, 1936.

WHEN I was invited to speak to you on the subject of machine tool and fixture design I was asked this question "What is the first thought you have in mind, in approving the design?

I am not going into the technical discussion of any design, but general principles, good practice and the things which cause the most trouble.

I am basing my thoughts on my experience, which I gained in the years when I was assistant chief-draftsman in the employment of one of the largest automobile companies in the world. In this department originates all production tools, fixtures, dies, conveyors, furnaces, ovens, welding equipment, gauges, plant lay-out, blueprints and files, outline operations of the parts to be manufactured, and control of part prints.

All equipment as outlined was designed or design approved, that was purchased from machine tool manufacturers. This being under one department eliminated any duplications. You will also notice there are no tool engineers, but foremen at the head of each department as previously mentioned, who outline the operations of parts to be manufactured in conjunction with production department foremen, eliminating any friction which may arise between these two departments. In this procedure everyone is in accord before engineering is started.

Proceedure

Among the many questions asked are: "What procedure was followed in approving all of this equipment as outlined under the different divisions?—when a design was submitted for approval and was not satisfactory this design was given to department foremen who had charge of this particular design of equipment with instructions to check the design and make recommendations and changes to meet our approval; also to consult with production department foreman for his criticism and approval. This close relationship with the production department eliminates many points which may cause trouble that the engineer is likely to overlook not being in close touch with the job every day.

Importance of the Fixture

What is the most important part of a machine tool? In at least 75% of cases, the fixture is the most important part, because the part that is to be manufactured can be machined just as accurately as the fixture is built.

Here are 19 points that should be followed closely in approving a fixture design:

1. Location of part.

2. Plenty of clearance to load and unload the parts to be machined.

3. Clamping of parts, so as not to distort and destroy the accuracy of part, after same has been machined and removed from fixture.

4. The clamping arrangement so designed that it will not distort the fixture when clamping the part.

5. Design to facilitate the changing of tools and perishable parts.

6. One of the most important parts in the design of the fixture is to get rid of chips as rapidly as possible in such a way that it will not interfere with the cutting tools, being sure that the chips will not lay on the fixture, moving parts or hydraulic pipes.

7. Chips if not properly taken care of will cause a great deal of damage to the equipment, that is to perishable and moving parts of the fixture. This chip problem should be given very serious consideration—but in a great many cases is neglected by machine tool builders.

8. When a coolant is used, same should be so arranged to flow freely on the tools and at the same time be protected that coolant will not spray all over the machine and operator.

9. Rigidity of design, to withstand abuse without affecting the accuracy of fixture. It should be designed to radiate the maximum amount of heat caused by the cutting tools and revolving parts.

10. All perishable parts should be made of a good grade of alloy steel heat-treated and ground.

11. All rest plates should be made to clean the surface of chips and grit which may adhere to the parts as same is moved into position. This is done by machining diagonal grooves across the rest plates and leaving the edges sharp so that when a part is moved over these plates it will scrape the surface clean.

12. Has the fixture been designed to use standard commercial tools, or standard adopted by the customer? Such as drills, reamers, spot-facers, milling cutters, taps, bushings, adjustable drill holders, or tap holders. Most designers believe that they must design a special perishable tool, and that it is impossible for them to use a commercial tool. In 99 cases out of 100 it is only imagination. I believe if the manufacturers would check their perishable tool stock they would find in a great many cases that they have many tools that vary very little in size. If more thought were given to these tools a large percentage of them would be eliminated.

13. In which case should a manually-operated or hydraulically-operated fixture be designed? This depends on the production and size of part to be machined. In cases where the part is small and on low production, manual operation is preferred. Where the part is large and heavy and the operator would have to handle an excessive amount of weight each day, then the fixture should be completely hydraulic. In a case where the operator has to handle a large amount of material, he becomes fatigued and loses his efficiency before the end of the day, so the gain in efficiency of the hydraulic over the manual fixture would soon pay for the difference in cost.

14. When designing a hydraulic fixture the oil passages should be completely manifolded. The

manifold should be designed so that no hot chips will collect on same, causing excessive heat in oil and that may in some cases affect the accuracy of the fixture.

15. The clamping arrangement for a hydraulic fixture should be designed so that the releasing of the clamps is accomplished with a higher pressure than required for clamping. This is accomplished by using the piston rod end of cylinder for clamping. The hydraulic cylinder, in a great many cases, should operate a mechanical self-locking arrangement, especially where there is heavy duty machining, and it also keeps the side of the cylinder smaller.

16. The indexing type of fixture where multiple operations are performed are of three types — the trunnion,—the rotary table and—conveyor. These fixtures cause more trouble than the single purpose fixture. The chief sources of trouble are: the spacings between stations, the setting of tools so that each station shall produce an interchangeable part, chips are one of the greatest sources of trouble on this type of fixture which should be given very careful consideration, the coolant should be so arranged that it can wash away the chips.

17. The fixture proper should be a complete independent assembly, that can be located on the trunnion, rotary table or conveyor as a separate unit for each station. This will make it possible to remove any one of these fixtures for repairs without affecting the operation of the machine.

18. The indexing mechanism whether hydraulic or mechanical will always have a tendency to lay or over-run its position. The locating pin should be straight with a bullet nose so that it will pull the fixture into correct position and at the same time will clean itself of any dirt or chips which may adhere to the pin. Never use a taper pin for locating, as it will not clean itself and any dirt or chips adhering to same will throw the location off.

19. The clamping arrangement, when clamping a rough casting or forging, should be designed so that the clamps can be re-tightened between each station while the fixture is indexing. When clamping on a finished surface this is not necessary.

These points that I have outlined in approving fixture design hold true for any type of fixture, whether the fixture is for a single or multiple indexing or continuous-operating machines.

The hydraulically-operated fixture is being used more every day on all types of high production machinery where there are multiple operations to the cycle of the fixture. This type of fixture has proven very satisfactory for its simplicity in design, speed and uniformity of operation. Every part is located and clamped into position always with the same pressure which is easily regulated for the required pressure. This is essential where the part is frail and accuracy is required for the part machined.

A question may arise in your mind why all the precaution in approaching the fixture design when purchasing a machine and fixture from a machine tool company. Most of the machine tool builders will admit they do not know much about designing a fixture or there is not enough profit in so doing and that they prefer the customer to design and build his own fixtures.

I believe this is understood in most cases and the different machine tool builders have developed over a number of years a standard machine for general purposes without any thought given to the necessary additional equipment, and in doing so, neglect to develop any engineers for this particular type of design. There are very few standard lines of equipment sold that are not completely equipped.

What is the most important feature in the machining of any part? In my estimation the design of the fixture for the first operation. The fixture should be so designed that it will equalize the part and that the finished machined part will be as nearly uniform throughout as possible, thus eliminating to a minimum any strains affecting the accuracy of any finished part. Take for example—the cylinder with multiple bores, everyone is interested in producing a uniform wall thickness in the cylinder bore. This should be the place from which to locate, and the fixture should be designed so that it will equalize the variations in the distance between the two end cylinders and the crankcase.

This holds true with pistons. They should be located on the inside diameter for the first operation to produce a uniform wall thickness.

Another example is the crankshaft. In a great many cases the crankshaft is not machined all over, the first operation being centering. The fixture should be designed to equalize the shaft from the part which is not machined. This will eliminate to a minimum the amount of stock to be removed for balancing. These fixtures are sometimes very expensive to build, but where there is large production it is money well spent.

Designing Special Machines

I will outline 16 points of procedure that should be followed in designing or approving semi-special or special machines. This class of machine tools has been increasing every year:

1. Make the tool layout.
2. Select the type of tools to be used—commercial or standard adopted by customer.
3. Figure the cutting speeds per minute and feed in thousands per revolution and make an experimental tryout.
4. Designing the fixture around the part and the tool layout.

Charles J. Martin's experience extends back many years. He served his apprenticeship at the American Iron & Steel Company, Reading, Penna., which is now a subsidiary of the Bethlehem Steel Company. Later joining the Ford Motor Company, he became a Tool Engineer and soon entered the Ford Engineering Department where he remained for five years. He was next placed in charge of Special Machinery Engineering. The last ten years of his stay with the Ford Motor Company, he was Assistant Chief Draftsman on production equipment. At present he is associated with Ex-Cell-O Aircraft & Tool Corporation, Detroit.

5. Determine the amount of travel that will be necessary for machining the part, also enough to remove tools and perishable parts of fixture in the minimum amount of time.

6. In designing the machine it should be in unit assemblies wherever possible, especially where they are subject to excessive wear and have to be replaced quite often. By doing this there can be a spare assembly carried in stock. This is economical where there is more than one machine of the same kind in use—such as grinding and precision boring spindles, where there are complete units which can be easily replaced. On way machines where there are travelling slides, a hydraulic unit can be used to a good advantage. It is a complete power unit in itself, the design provides for rapid advance feed and return also provision is made for a dwell at the end of the feed. There are two types of these units manufactured today, the *sliding* type and the *quill* type. These are very economical to use and have a high salvage value. The spindle speeds can be changed very easily. The length of stroke and feed rates can be changed in a very few minutes without any cost by adjusting feed valve and dogs that operate and control the complete cycle. These units can also be mounted in any desired position and will drive a single tool or a multiple head when several operations are to be performed. These units can also be used as prime movers or drivers for other machine units for milling, boring or similar operations.

7. The selection of materials for the different parts of the machine should be checked very carefully as there is a tendency for the engineer to get into the habit of using one type of steel for all parts. The type of castings and steels should be selected and treated according to the wear and abuse to which they are subjected. This sometimes causes serious trouble if the proper materials are not used.

8. The factor of safety should be at least four or five for machines in the automobile industries where accuracy is of major importance and no vibration tolerated, the machine should be designed for maximum rigidity and heavier than what is required for strength alone.

9. The oiling system of any machine should be checked very thoroughly as the engineering is in progress. In a great many cases this is left until the design is complete with the result you have trouble incorporating an efficient oiling system in the design of the finished machine. A good oiling system is far more economical than a repair bill.

10. The type of ways that should be used when there are sliding heads or tables to produce a precision job. One should be V-type and the other flat way and should be more than 2½ times as long as the distance from the V to the center of the flat way. The slide should be heavy enough to absorb any vibration caused from the rotating parts or the machining operation performed. The Ex-Cell-O precision boring machine and similar precision machines are designed according to this rule. Where extreme accuracy is not required two flat ways or two bars are sufficient for guiding any slides.

11. Spindle and spindle mountings should be very carefully designed. In production machinery where a machine runs continually 16 hours or more per day the spindles should be designed for long life. There are three types of spindle mountings — the taper roller bearings,—the ball bearing, and the plain bearing either straight or tapered. The *taper roller bearing* should be used for heavy duty spindle. The *ball bearing* for drill spindles or lighter operation and also for precision work. The *plain bearing* is probably the most accurate bearing of these three, but it does not have the life and generates more heat and causes more trouble than the anti-friction bearings.

12. The kind of material that should be used for the bases and housing of various machines: Where any degree of accuracy is required high grade castings should be used. There are a great many machines built today of welded steel construction. This is very economical when only one machine is being built and probably will not be duplicated or where close accuracy is not required.

13. The reduction gears on all machines should be mounted on anti-friction bearings. They should be designed to the accepted rule for the required horse-power, but in practice the width of the face of the gear should be at least twice as wide as the theoretical required gear to provide a longer life. Where the speed of the gear is not very high the oiling system can be of the submerged type. On very high speed gears a circulating system provided so that the high speed gears will not churn the oil and create a tremendous amount of heat which will cause ultimate failure.

14. Electrical equipment — all motors should be mounted in an accessible place for ease of maintenance and not mounted within the housing of the machine as they are likely to overheat. The electrical control equipment should not be mounted in the housing of the machine but should be mounted outside of the machine or in a separate control housing box. If they are mounted in the housing of a machine they are subjected to dirt, chips, heat and oil leakage which will tend to cause short circuits and probably cause a great deal of damage.

15. Hydraulically-operated machine. The pump and necessary operating equipment for these machines should be mounted in a self-contained unit including the motor mountings and oil reservoir as manufactured by different companies. This is a recent development and is designed in such a way that air can circulate completely around this unit with the result little heat is transmitted to the machine proper. The oil passages should be manifolded wherever possible, this will eliminate leaks and requires a minimum amount of space if properly designed. The hydraulic operating valves should be mounted on the machine where they are easily accessible for repairs. The machine designed along these lines will have a neater appearance.

16. As previously discussed the machine should be designed in units whenever possible. This is generally practical on way, vertical indexing and vertical turning machines. In the majority of these cases the self-contained hydraulic unit can be used to a good advantage.

The most recent development in machine tool design is the

(Continued on page 33.)

A. S. T. E. CHAPTER NEWS

CLEVELAND

Cleveland Chapter's first meeting after the summer vacation season was held in the Nela Park General Electric Institute, Cleveland. This meeting was the first of this Chapter to allow the ladies to be present for the dinner session. An official hostess of the General Electric Company escorted them through the Institute Building while the technical part of the meeting was in session.

Following the dinner, the drawing for the "free meal" was held and Mr. F. E. Davis of the National Acme Company won. The technical session was addressed by Mr. L. E. Shaner, Editor of the trade publication "Steel" and Vice-President of the Penton Publishing Company. Mr. Shaner spoke on the subject "What is Ahead in Engineering Development." He defined Tool Engineering as "the devising of manufacturing processes, the orderly arranging of their sequence, and the designing of all production equipment." To illustrate the key position that the Tool Engineer holds in the industrial field, he went back twenty-eight years ago when he started as an apprentice in a shop for a railroad. He told how the Interstate Commerce Commission ordered certain safety devices, and how it was the Tool Engineer's task to take different ideas as handed down from the "front office" and various officials and make them practical.

In speaking of the progress made, he mentioned the tolerances that are required today, the change in materials, and methods of fabrication. According to figures by different manufacturers, in 1912 it would have cost $3500 to build a $600 automobile, $1000 to build a $150 typewriter and $1000 to build a $100 radio. This progress has been made possible only by constant developments in Tool Engineering.

In speaking of the future, Mr. Shaner related considerable statistical information that showed our great potential prospects. Our country must be completely rebuilt. To accomplish this we must continue in efficient manufacturing and mass production which, according to the speaker, are not the causes of unemployment. New developments in raw materials, fuel, reduction of ore, and new methods of fabrication, all will figure in the future progress of Tool Engineering.

Because the present industrial system is so high geared, that is, interlocking in character, there is a great need for the development of social workers, statesmen, and politicians to study the industrial problems in order to effect a better understanding, in turn causing less unemployment. The Tool Engineer's path is charted by the economic structure of our country.

The best way for the Tool Engineer to capitalize on his profession is by making the world conscious of the part the Tool Engineer plays in industry.

Upon the completion of the lecture there was a question and answer discussion after which the meeting was adjourned at 9:30 P. M.

DETROIT

The September meeting, held at Hotel Fort Shelby, seemed to augur a progressive year. Nearly a hundred members and friends attended the dinner, while the attendance at the technical session was very gratifying. In lighter vein, the evening was leavened with a fine floor show, sponsored by Ex-Cell-O. Motion pictures of A.S.T.E.ers, with their friends and families, was a pleasant surprise for which we may thank Mr. Chas. French of Sterling French Mach. Co. Another feature, which will bear repeating, was the introduction of each man (and a lady) present, to the group. Kept up, this will knit the Society more closely, as members become acquainted.

The speaker of the evening, Mr. Charles J. Martin, Production Engineer of Ex-Cell-O Aircraft & Tool Corporation, rounded out the session with a very interesting and instructive talk on: "Fundamentals of Tool and Fixture Design." This subject is presented elsewhere in this issue.

Detroit Student Chapter

Silence is a "virtue," rarely expected or found, in youth today. Yet as we look back over the past year we find several of the Senior A.S.T.E. meetings which were devoted to discussions of youth—and, there were several controversies over youth's conduct, knowledge and experience. There were also articles written in this Journal about the young man who would succeed in Tool Engineering. Through all this we have sat back, listened and read,—and, *silence* has been our virtue.

In the May, 1936 issue of *The Tool Engineer* an article appeared about the formation of this Student Chapter. Since then many of the members of this chapter have practical experience in Tool work for the first time. Now, bolstered by more confidence, youth speaks. We invite all senior members and their friends to our first meeting of this season, as announced elsewhere in this issue. This meeting has been arranged and will be conducted entirely by our student members.

Take it upon yourself to be present and you will be cordially received. The stability that characterizes the members of the Senior bracket will not allow them to let its youngsters down. We expect you.

MILWAUKEE

Milwaukee Chapter's September meeting, the first to be held this fall season, proved to be highly popular and was voted to be continued. Features of this meeting were an "around the blackboard" discussion, starting at 8 p.m. Mr. Charles Hintz of the ZIV Steel & Wire Company, Milwaukee, led this discussion with a "chalk talk" on the subject "Problems on Die Design and Methods of Hardening."

Following this part of the program for the evening, Dr. Ihrig of the Globe Steel Tubes Company, Milwaukee, gave a most interesting lecture on "Ihrigizing" of ferrous metals—a method developed by Dr. Ihrig. The meeting was very well attended.

HANDY ANDY'S WORKSHOP

I don't know at this time, how the other Chapters made out, but Detroit opened the 1936-'37 season with a bang. Thanks to Ex-Cell-O Aircraft & Tool Corp., we had a great ol' floor show, with Corrine Muir doing the high Cs and a couple of boy friends and a one man menagerie helping out with miscellaneous. But that juggler hasn't seen it all yet—he should have been out to the picnic tossing eggs.

* * * * *

Of unusual interest was the movies (Mr. Charley French of Sterling-French Machinery Co. ran *that* show) of our golfers at the A.S.T.E. Golf Tournament, and the picnickers at Maple Grove. Now I know who the sonofagun is who kicked my shoe away in the scramble. Incidentally, the winners in the egg tossing contest showed real class. *I* say so.

* * * * *

Among those present that evening was Miss Genevieve Zube, our winsome young Assistant Secretary. Come again, Miss Zube.

* * * * *

I see by the *news* that Otto Winters is moving to the suburbs—Toledo, to be exact—where he will do things for Kent-Owens Machinery Co. Knowing Otto as I do, I congratulate his new boss.

* * * * *

You know, I pulled a boner (another one) in a previous issue. It was really my job to mention the prizes donated by various of our friends at the Golf Tournament, but I balled the works all up. Excuse it, please!

* * * * *

Now that I've started it, I'll have to keep up my little personal Hall of A.S.T.E. Fame. The heck of it is, I don't know all the boys, and a lot of good ones deserve mention. I'll bet there are some real fellows scattered among the gang North East West South, but some of them will doubtless show up the 8th. Look me up. Anyway, I'll do the best I can between now and next April, when my term is up. So, patience and—expectations.

* * * * *

One A.S.T.Eer I want to mention is Joe Siegel. A former President (before we got *National*) Joe has been one of our mainstays, and not the least of his accomplishments is his flair for providing good eats. Last spread he put on I had indigestion, (*before*, not after) but his artistic array of delicacies was too much for me. I took a chance—and have been okay ever since. Thanks, Joe.

* * * * *

More and more, the A.S.T.E. is becoming known as a *friendly* organization. Well, that is as it should be; we are all working for the same end.

* * * * *

Since the last issue of *The Tool Engineer*, there seems to be quite a demand for household appliances—especially around Saginaw. Wonder if that article: "What is wrong with Tool Design?" had anything to do with it.

* * * * *

We may look to a new chapter in Toledo soon. Otto Winters won't be overlooking any bets, and those Toledoans are a bunch of live wires. A word to the wise, you know.

(Continued on page 34.)

Production Perspectives

(Continued from page 16.)

Jaynes, 57, former secretary-treasurer of the **Standard Foundry Co.**, Hartford, died September 8.

Pickering Governor Co., engine governors, Portland, is building a one-story addition, 22x42 feet, to provide larger production space. . . . . **Waterbury Farrel Foundry & Machine Co.**, Waterbury, is drawing plans for a large plant addition on property recently purchased. . . . . **Alsop Engineering Corp.**, New York, has purchased the former **Hartford Battery Sales Corp.** plant in Milldale and is preparing to start production of electric household utilities, gasoline pumps, bottle fillers and labelling devices. . . . . N. Hjalmar Geruldsen, 57, president and secretary of the **Nautical Lamp Co.**, Plainville, died September 2. He was the oldest marine lamp manufacturer in the country. . . . . Clayton S. Jenkins, treasurer of the **Collins Co.**, Collinsville, makers of axes and edge tools, completed 50 years with the company on September 1. . . . . Earle B. Lewis and George S. Scott, operating the **Lewis & Scott Mfg. Co.**, Plantsville, toys and novelties, have bought the former **H. D. Smith Co.** drop forging plant and machine shop in Southington. . . . . **United Aircraft Corp.** is operating its plants in East Hartford and Stratford at a record high level, with about 5,000 employed. A large manufacturing building is being erected for the **Hamilton Propellor** division and a third-story addition on the **Pratt & Whitney Aircraft** building, both in East Hartford. Other divisions are the **Chance-Vought** airplane plant in East Hartford where a $10,000 addition is being built, and **Sikorsky Aircraft Corp.** in Stratford. . . . . Washing machine, plastics and metal cleaning equipment divisions of **Colt Patent Firearms Mfg. Co.**, Hartford, are reported as maintaining brisk activity, while the work of cleaning up and repairing damage from the March flood is still in progress. . . . . **Aerotorque Engine** Co., New Haven, has been incorporated by George Parmly Day, Elias Orshensky, Jr., and Edward Coty Jackson. . . . . **Columbia Phonograph Co.**, Bridgeport, is making extensive alterations in one of its factory buildings. . . . . **Segal Lock & Hardware Co.**, Norwalk, reported unfilled orders August 1 of $502,718 compared with $159,258 on the same date last year. For the seven months ended August 1, sales and shipments of all **Segal** divisions increase 39 per cent over last year. . .

Risdon Mfg. Co., Naugatuck, is expanding operations and is now using part of the old **Smith & Griggs** plant in Waterbury. George T. Wigmore, **Risdon** secretary and treasurer, died in August. . . . **Billings & Spencer Co.**, Hartford tool manufacturing concern, reports losses for the fiscal year ended June 30 were $6,829 compared with a loss the previous year of $17,349. General Manager W. Roy Moore says production costs will be cut substantially by rearrangement and repairs to equipment now in progress. . . . . **Southington Hardware Co.**, Southington, showed an increase of 30 per cent in sales for its last fiscal year, ended June 30. . . . **Miller Co.**, Meriden, has announced election of S. J. Roby as vice-president in charge of the oil lamp division, recognizing his 50 years connection with the company. . . . . **General Electric Co.**, Meriden, is now producing a white, single unit hood for a meat chopper for the **Plaskon Co.**, affiliate of **Toledo Scale Co.** The hood is in a single piece, of light-weight, easily-cleaned material, and is made on a 680-ton press in the G-E plastics department.

LETTERS

September 9th, 1936.

The Tool Engineer,
2842 W. Grand Boulevard,
Detroit, Michigan.

My dear Editor:—

Who will go the farthest in Tool Engineering, the "Practically Trained Man" or the "College Graduate." I have read a lot of hoon-doggle musings on this subject but have never read real facts pertaining to the question.

1st. Every successful Tool Engineer who is *not* a college graduate recognized the advantages of a college education and procured the equivalent as quickly as possible, therefore, HE HAS WHAT IT TAKES and that, is why he is successful.

2nd. Every successful Tool Engineer who *is* a college graduate recognized the advantages of "Practical Training" and procured this training as quickly as possible, therefore, HE HAS WHAT IT TAKES and that, is why he is successful.

3rd. A college man can procure practical training far easier and with *much less effort* than a practical trained man can procure the equivalent to a college education.

4th. The question is very foolish to start with because we in industry can recognize the time value of a good college education and we also realize that the question cannot be reasoned and answered intelligently without considering individual characteristics along with human behavior.

(Signed) A. W. Lovell,
2375 77th Avenue, Phila., Pa.

A foolish question, sez you? And you answer it. Now, Mr. Lovell! Anyway, we weren't trying to *settle* this question; we were just provoking thought on it—and succeeded. But thanks for the *facts.—Editor.*

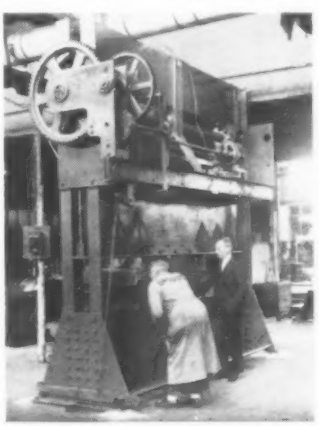
Cortland, N. Y. Sept. 9, 1936.
51 W. Main St.,

American Society of Tool Engineers,
2842 W. Grand Boulevard,
Detroit, Michigan.

Gentlemen:

After reading your article in "Tool Engineer" Magazine entitled "Should manufacturers make tools and machinery?" the writer became interested in the discussion of this subject as I have been up against this same question many times during the past fifteen years. As a tool maker, tool designer and a master mechanic the last ten years in direct charge of tool engineering and tool room, I naturally gained an experience which I figure is valuable when a question as the above is asked.

About seven years ago in a Truck Plant in Detroit, I appealed to the management for equipment for making the larger pieces of deep drawing stampings. A togle press of considerable size was necessary but the price was prohibitive. My tool makers were not busy so I asked permission to make the necessary Hydraulic Equipment in our own department. Evidently convinced of my ability to design the right thing, I obtained permission from the President of the Company and the result was a 400 ton Press, photo of which is enclosed, with a 40 inch stroke capable of drawing parts up to 14" deep.

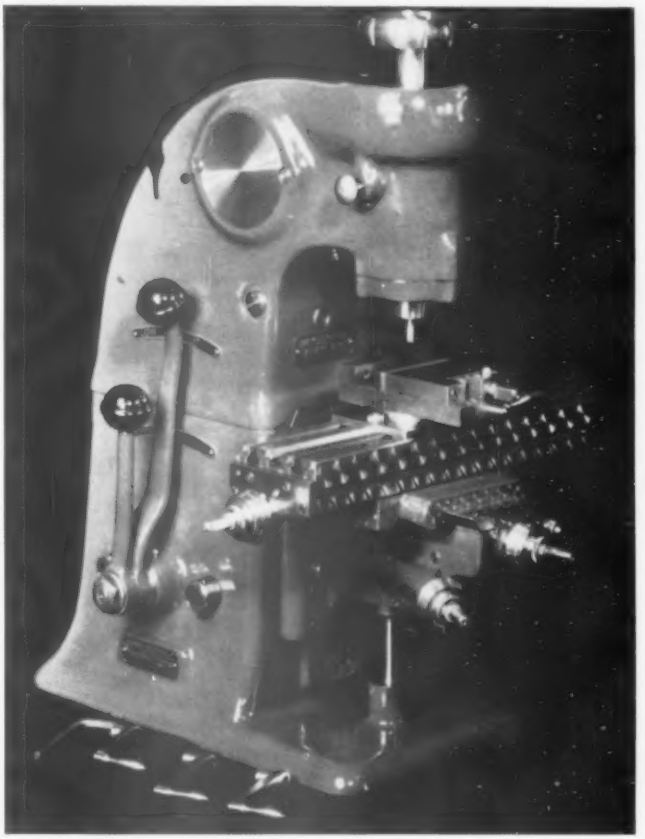


A similar condition existed here in the East in a Truck Plant. We wanted a double crank punch press and a 10' Press Brake, but the production did not justify the expenditure for both machines. Therefore, permission was given to make a 11' Press Brake and I then constructed a machine with Die space necessary to allow 6" parallels in order to take in all blanking dies necessary for our production.

(Continued on page 34.)

New Equipment

Hardinge Brothers, Inc., Elmira, New York, have introduced to the trade a new Precision Vertical Milling Machine with ball bearing spindle construction for high spindle speeds. This new machine is for bench mounting and the design and appearance are attractive, as may be seen from the illustration.



The new Hardinge Vertical Milling Machine, it is claimed, will make intricate milling operations on small parts comparatively simple. The illustration shows the vise in place—there are index heads, tailstocks, swivel base, universal adapters, right angle bases, level feed arrangements and routing attachments available.

The spindle construction embodies precision preloaded ball bearings of the double row type. Such a design, it is claimed, affords high spindle speeds with extreme precision and overcomes radial and end play.

The machine is fully enclosed to exclude dirt, chips, etc., and also to contain the driving belts to the spindle. An electrical driving unit is mounted under the bench to give eight spindle speeds up to 5000 RPM. Full details may be had by addressing this publication.

* * *

According to officials of the Charles Bruning Company a saving of 25 to 10% in drafting time may be effected through the use of three new drafting machines this company has announced.

Each of the new machines is equipped with an adjustable brake mechanism to prevent the protractor

(Continued on page 34.)

Temperature Control

By R. A. HOLT

MEMBER A.S.T.E.

THE subject of temperature control in manufacing is being given much attention these days. This is caused, for the most part, by the ever decreasing limits of tolerance by manufacturers. It is a fact that production parts are made today to limits that were considered good for a gage a few years ago. This causes the gage limits to be reduced until they are now in many cases expressed in millionths of an inch.

It has been found necessary on certain operations such as boring or grinding a hole to provide means to bring the gage to the same temperature as the work to properly check and hold the component part within its limits. Another good system has been to determine by experiment just how much the part is expanded or contracted during the operation and make allowance for this on the gage.

All these things have been necessary because of temperature difference, that is, difference in temperature between master and part to be inspected or difference between parts to be assembled.

Since interchangability in manufacture is the main reason for all this and to obtain interchangability, we must resort to gaging methods that will assure it, we will confine the rest of this article to the subject of the gage.

First, we have gage blocks which we are given to understand are within certain guaranteed limits of accuracy at 68 degrees Fahrenheit. There are obtainable instruments at a moderate cost that will measure and give identical results to within five millionths of an inch. Now, it would seem our problem is solved, but on the contrary, we have only taken into consideration the mechanical side. The two factors most difficult to control are temperature and the human element.

Many have believed that with the addition of a temperature controlled room, the desired result would be produced, but the fact is unless skill is present an opposite result may occur. We must keep in mind the fact that steel has a co-efficient of expansion of over six millionths per inch per degree of Fahrenheit and although the room temperature may be exactly 68 degrees, that is no assurance that either master or gage to be checked is 68 degrees. What the writer is trying to convey is that a few degrees above or below the stated 68 degrees will not have a measurable affect, but that a difference in temperature between the master and the gage will affect to the tune of over six millionths per inch per degree of Fahrenheit. Just figure this out for a six inch diameter plug gage. A difference of one degree will cause a deviation of over thirty-six millionths. And certainly you will agree that one degree is a small change. This all proves one thing, that a skilled operator can make more accurate comparisons in a temperature of 90 degrees than a mediocre or inexperienced man can at the approved 68 degrees.

From long experience he must be able to judge how long it will take for a certain size piece to come to room temperature. It is surprising how long it takes for the last two or three degrees to get there.

Assuming that perfect temperature is attained in both master and part to be checked, other things now present themselves. If it is at 68 degrees, the operator may not touch either part with his bare hands. He must be careful that his breath is not directed toward the parts. Also, some sort of guard should be provided to prevent the body temperature of the operator from affecting the parts or instruments.

Now then if the temperature were 90 degrees and again assuming that both gage and part have reached 90 degrees, the condition will be as follows: First, if the master and part to be checked are of different materials, then of course, the difference in coefficient of expansion between the two metals must be taken into consideration. But, if as is usually the case where gaging is concerned, both master and gage to be checked are of steel, no difference will occur and the following conditions will apply. Because of the increased temperature (we are now considering 90 degrees) the body temperature will less affect measurements, also the proximity of the operator's hands will not cause a rapid change to take place.

The foregoing has been to explain and justify the writer's contention that rather than temperature control of rooms, skill is by far the more important. Desirable results can be obtained with skill and without the room, but these results cannot be obtained with the room and without the skill.

NATIONAL ACME SPINDLE CARRIERS

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Bore-Matic

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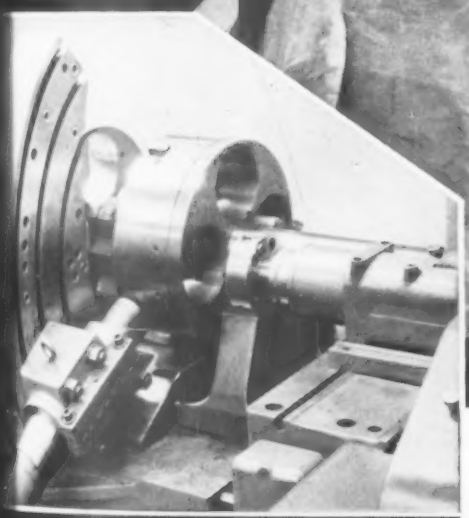
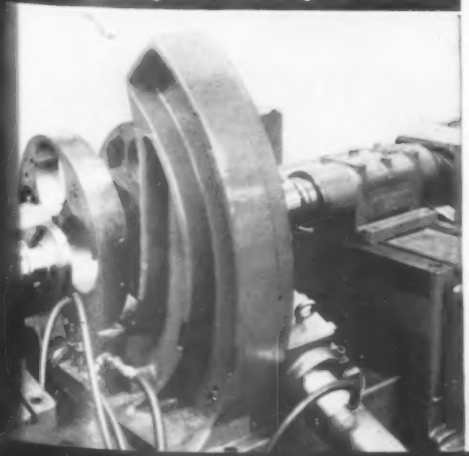
rance of .0003".



. Indexing arrangement. Boring
nd facing shoulder, rear end.
Below. Borizing front holes in spindle carrier.



Determined to produce the most accurate product possible, the National Acme Company of Cleveland have installed a Heald No. 45 Bore-Matic for borizing the bores in their spindle carriers.

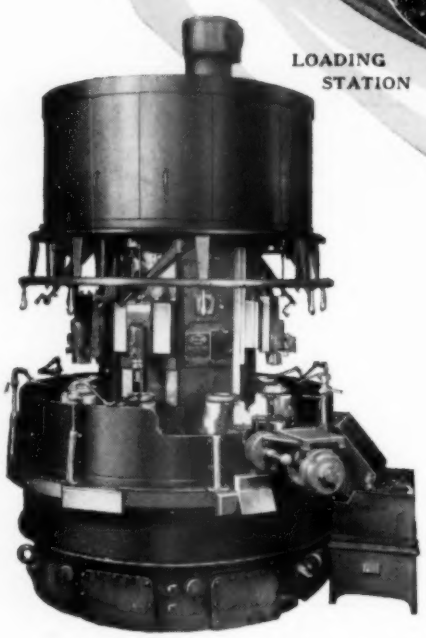
This machine is particularly well suited for this work, handling many types of carriers, some of which weigh approximately 1000 lbs. Material is cast steel.

The number of holes bored varies with the type of carrier. The photographs show a 4-spindle type in which four holes are bored at one end of the machine and another set of four holes is bored and faced concentrically with the first set at the other end. The holes are 8" in diameter and are held to a size tolerance of .0003". The holes are spaced within a tolerance of .0005" with the accumulated tolerance not exceeding .0005".

This same No. 45 Bore-Matic is being used for finish boring all styles and sizes of cylinder blocks for various motor manufacturers; both in America and overseas.

THE *Heald* MACHINE CO. – WORCESTER, MASS.

7 Machining Operations Simultaneously



TYPE D MULT-AU-MATIC
ON DIFFERENTIAL GEAR CASE

The Mult - Au - Matic Method provides manufacturing Efficiency and Economy through effective Savings.

Proof of this is Bullard Estimates on your work. Send us Blue Prints or Samples.

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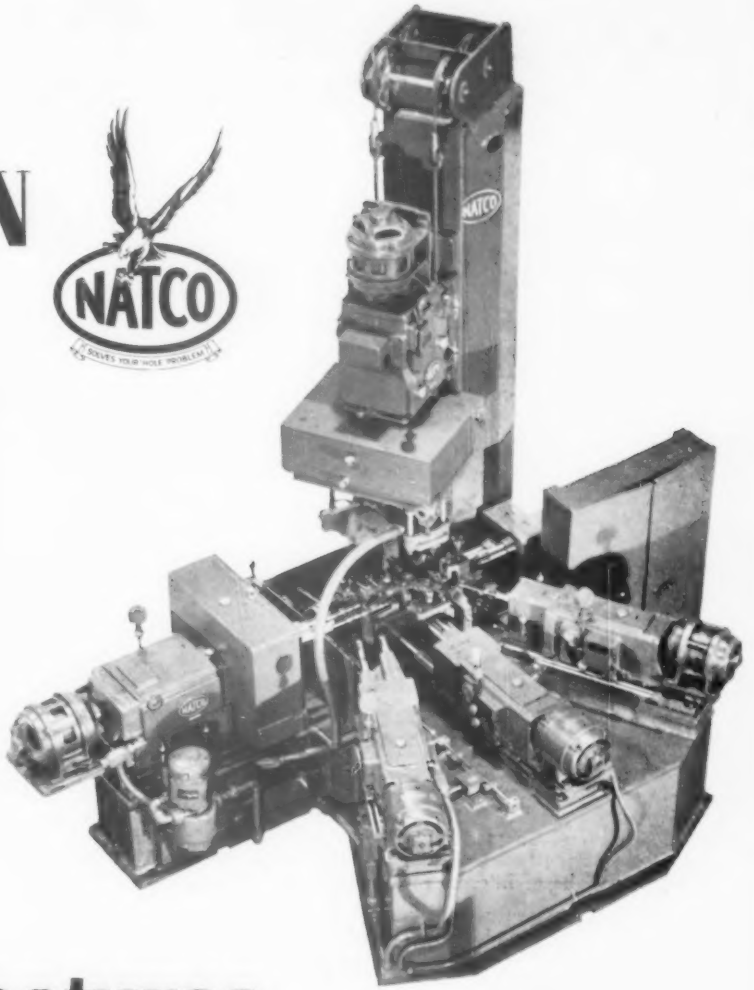
MODERN "HOLEUNIT" CONSTRUCTION



● Use NATCO "HOLEUNITS" in building your drilling, boring, and tapping equipment. They make possible the building of highly specialized machines for high production—yet they are standard in every respect. NATCO "HOLEUNITS" are flexible and interchangeable—are completely self-contained and no connections other than electrical are required.

● NATCO "HOLEUNITS" are arranged with a semi-automatic hydraulic feed and will operate mounted at any angle. They may be arranged in groups to perform all the required operations on a casting with a single handling. Should the part for which the units are arranged be altered or discontinued, it is only necessary to rearrange the units, equip them with new spindle boxes and the machine may be used for an entirely different piece of work.

● Illustrated at the right is a six way NATCO machine —distinctly a single purpose machine built to perform a number of drilling and reaming operations on a forged steel crankshaft—yet the machine is built of standard NATCO "HOLEUNITS". Investigate these "HOLEUNITS" today. They are built in a variety of sizes and capacities. Call, write or wire for a NATCO representative today.

Consider the features of the NATCO Method of Building Drilling, Boring and Tapping Machines

● Competition is forcing many manufacturers to reduce production costs. Beat competition and lower your costs now. NATCO Engineers will be glad to study your drilling, boring, and tapping problems. Without any sort of obligation on your part we will make a careful survey and lay our recommendations before you—then you be the judge as to whether they can save you money. Send in your prints or call a NATCO representative today.

● Chicago Office, 2009 Engineering Bldg., 205 W. Wacker Drive. Detroit Office, 409 New Center Bldg. Factory and Home Office, **The National Automatic Tool Co., Richmond, Indiana.**

NATCO *Drilling, Boring and Tapping Equipment*

OCTOBER CHAPTER MEETINGS

Chapter Meeting Announcements must be received on or before the 20th of preceding month. Any omissions are the result of not receiving this information by this date—in time for publication.

CLEVELAND

October 20th, 1936

Dinner: 6:30 P. M.

$1.00 per plate

Technical Session at 8:00 P. M.

Nela Park, General Electric Company, Noble Road Entrance

Dinner and Technical Session will be held in the Dining Room in the Sales Promotion Building.

Speaker: MR. R. E. W. HARRISON, Vice President, Chambersburg Engineering Company

Subject: "Modern Drop Forging in Relation to Machine Shop Practice"

Cleveland Chapter is fortunate in securing Mr. Harrison who is one of the best technical speakers in the country and his subject will be of interest to all process engineers.

Mr. Harrison was formerly Chief Engineer of Cincinnati Grinders, Inc. and when elected to the Vice Presidency of the Chambersburg Engineering Co., was Chief of the Machinery and Agricultural Implement Division of the Bureau of Foreign and Domestic Commerce in Washington.

He received his early engineering training in England, where he was employed for a number of years by the Churchill Machine Tool Co., Ltd., where he served in the various capacities of Assistant Works Manager, Head of the Work Progress Dept., also was in charge of Tool Engineering. He is a member of many leading technical societies both here and abroad.

DETROIT STUDENT CHAPTER

October 15th, 1936

East Room, Hotel Fort Wayne, Detroit, 8:00 P.M.

Speaker: MR. J. D. MINTON, Associated with Taft-Pierce Manufacturing Company

Subject: "Precision Measuring Instruments" (illustrated with samples of instruments, etc., including the *Zeiss* instruments.)

All Senior Members are cordially invited.

MILWAUKEE

October 8, 1936

Republican House, Milwaukee
(In the Colonial Room)

"Around the Blackboard Dscussion"—8:00 P. M. Half hour discussion of shop problems.

Speakers: B. H. WORK and W. T. McCARGO, Engineers, with the Carborundum Company, Niagara Falls, N. Y.

Subject: "Manufacture of Abrasive Products"—8:30 P. M. with a special talk on tool room grinding.

NOTE:—Following this talk there will be an entertainment program and a buffet luncheon. Tickets 75c per person, obtainable on admission. A large attendance is anticipated.

RACINE

October 9th, 1936

Dinner: 6:00 P. M. Kenosha Elks Clubhouse, Kenosha, Wis., $1.00 per plate.

Speakers: D. M. AVERILL, General Works Manager, Russell Mainland, Asst. to General Works Manager, W. G. Careins, Manufacturing Engineer—all of the Nash Motors Company.

Subjects: The Speakers will cover several manufacturing processes in operation at the Nash Plant.

NOTE:—A trip through the Nash plant will start promptly at 1:00 p.m. from the main office of the Nash plant in Kenosha. The tour will cover all manufacturing and assembly departments engaged in producing the new 1937 models of Nash cars.

Reservations must be made, not later than, Wednesday, October 7th. Mail or phone reservations to Nash Motors, Racine Division,—telephone JAckson 6460.

Readers of *The Tool Engineer* and friends of the American Society of Tool Engineers, whether members or not, are cordially invited to any of the above meetings.

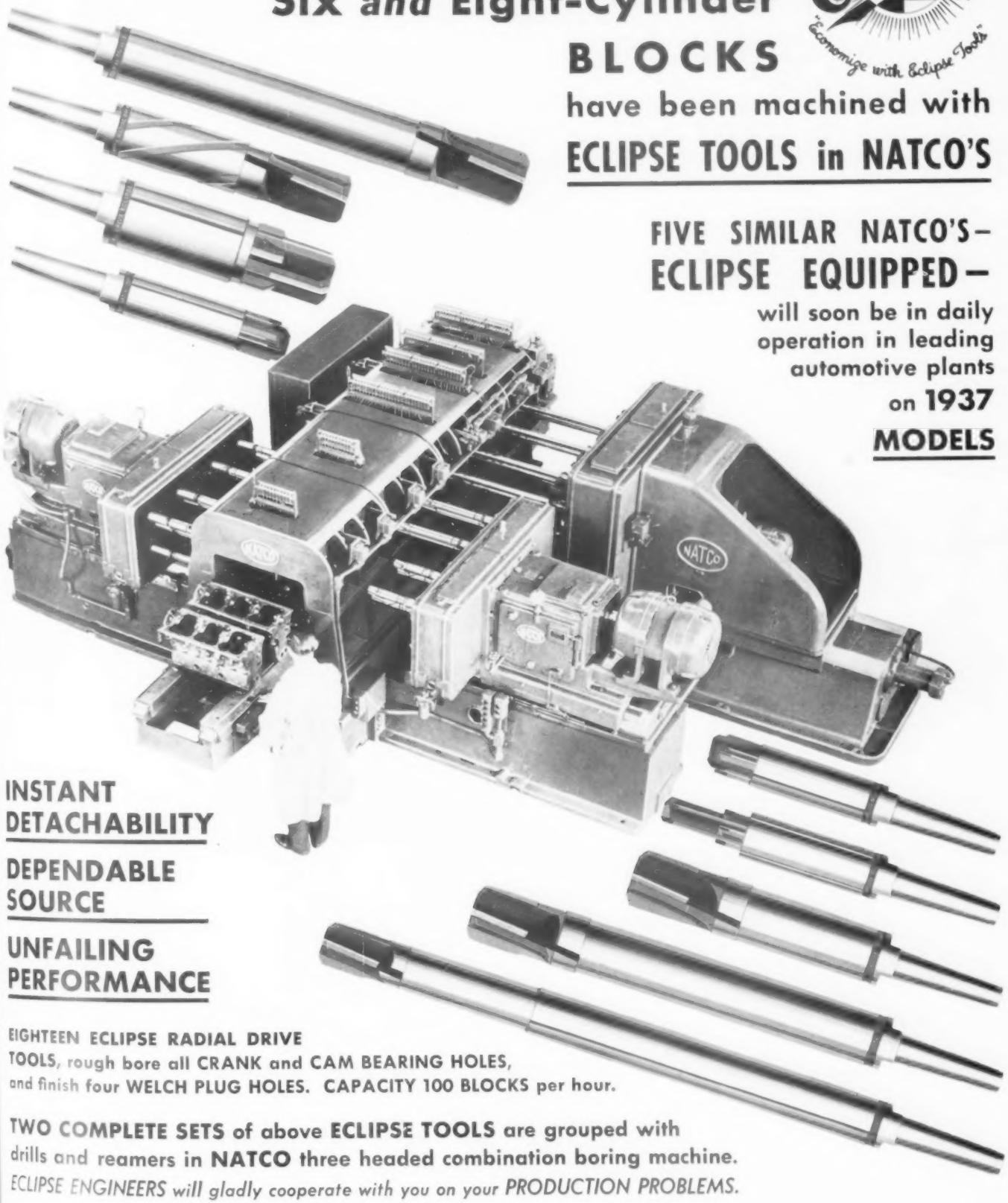
OVER 1,800,000—

Six *and* Eight-Cylinder BLOCKS

have been machined with

ECLIPSE TOOLS in NATCO'S

Eclipse "Economize with Eclipse Tools"



FIVE SIMILAR NATCO'S—
ECLIPSE EQUIPPED—
will soon be in daily operation in leading automotive plants on **1937 MODELS**

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UNFAILING PERFORMANCE

EIGHTEEN ECLIPSE RADIAL DRIVE TOOLS, rough bore all **CRANK** and **CAM BEARING HOLES**, and finish four **WELCH PLUG HOLES. CAPACITY 100 BLOCKS** per hour.

TWO COMPLETE SETS of above **ECLIPSE TOOLS** are grouped with drills and reamers in **NATCO** three headed combination boring machine.

ECLIPSE ENGINEERS will gladly cooperate with you on your PRODUCTION PROBLEMS.

Send for Eclipse Catalog 35

ECLIPSE COUNTERBORE COMPANY

DETROIT 7410-30 ST. AUBIN AVE MICHIGAN

Engineers in all industrial centers.

WHAT IS WRONG WITH TOOL DESIGNING?

(Continued from page 11.)

believe that tool design still lags behind machine design, and that industry as a whole will benefit from a broader consideration of tool design. This is not conjecture; manufacturing concerns that place the proper value on the design of its tools are well rewarded financially as a result.

Lest this article may contain a discouraging note for the detailer and the draftsman with limited designing ability, I would add that really good detailers are a godsend to a harried chief engineer. Better a good detailer than a poor designer. Then, too, the detailer may be but serving an apprenticeship, to later graduate to competence. I say, *may be*, because many detailers have become inured to their jobs, or, may be so good at detailing that it is executive policy to retain them on such work. If, however, a reader should be curious regarding the difference between the designer and the confirmed detailer, I would suggest that it is a difference, first, in designing ability, and second, in enthusiasm and aggresiveness. A topnotch designer is quite apt to have a forceful personality. He has to have, considering that he has to sell his ideas.

In conclusion, I would say that the *wrongs* of tool design will be righted through orderly evolution as the value of properly designed tools is impressed on management. Incidentally, the human factor will improve as colleges begin to seriously consider training men in tool engineering. Mass production is young yet, and the Tool Engineer, under that name, is only as old as the American Society of Tool Engineers. The A.S.T.E. has raised a craft to a profession; the *profession* will raise standards of design to heights as yet barely dreamed of.

Psychology for Tool Engineers

A 15-weeks course in psychology for executives is being prepared by Clayton J. Ettinger, B.S., M.A., M.D., Ph.D.

The lectures will be illustrated by lantern slides and will be a survey of the facts of human psychology, emphasizing practical applications.

The course comprises a survey of the applications of psychology to business and industry, bringing out the principles of prediction and control of behavior. The lecturer will present the result of studies of the psychological aspects of adjustment to present-day occupations and factors related to proficiency, leadership and scientific management. For full details call or write O. B. Jones, 8203 Woodward Avenue, Detroit, Michigan, MA 8422.

Athol, Mass.—Announcement was made by the L. S. Starrett Company that a blanket 10 per cent raise had been given every employee of the factory. Willard G. Nims, treasurer of the Company, stated that the increase is due to better business. Six hundred employes, nearly the peak of normal years, are now employed.

RIVETT PRECISION SCREW CUTTING LATHE

#608

Known throughout the world as "The Master Workman's Master Tool" in laboratories and development departments where highest possible precision standards are required. Its finely made attachments enable a skillful user to finish practically any operation without recourse to other machines. Offered with quick change gear box or change gears; oil pan, bench or cabinet mounting; speed box, horizontal safety drive or countershaft driving equipment. See Bulletin 608-B.

RIVETT LATHE & GRINDER, INC.

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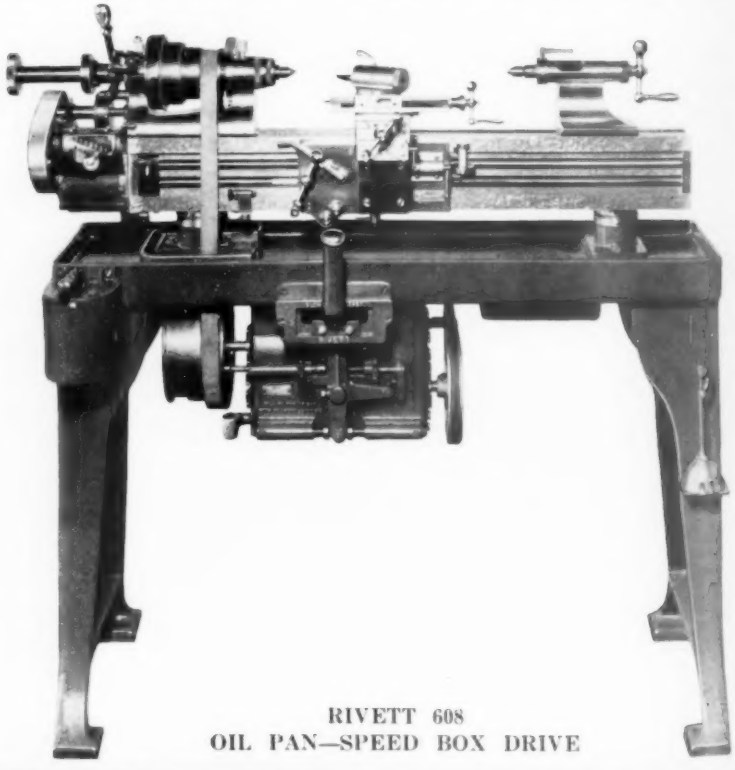

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OIL PAN—SPEED BOX DRIVE

PRODUCTION *plus...*

WITH

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Cemented Carbide Cutters

STRONG...RIGID...ACCURATE...

Furnished in all types of Face Mills . . . End Mills . . . Side Mills . . . Core Drills . . . Reamers . . . Hollow Mills . . . Combination Tools . . . with all grades of Cemented Carbide to suit various materials. • Ingersoll Zee Lock Cemented Carbide Cutter Blades are simply and securely locked in a forged and case hardened alloy steel body.

The tipped cutter blades are solidly backed with no blade overhang from cutter housing. The body is generously relieved in front of the blade both on diameter and face insuring adequate chip clearance.

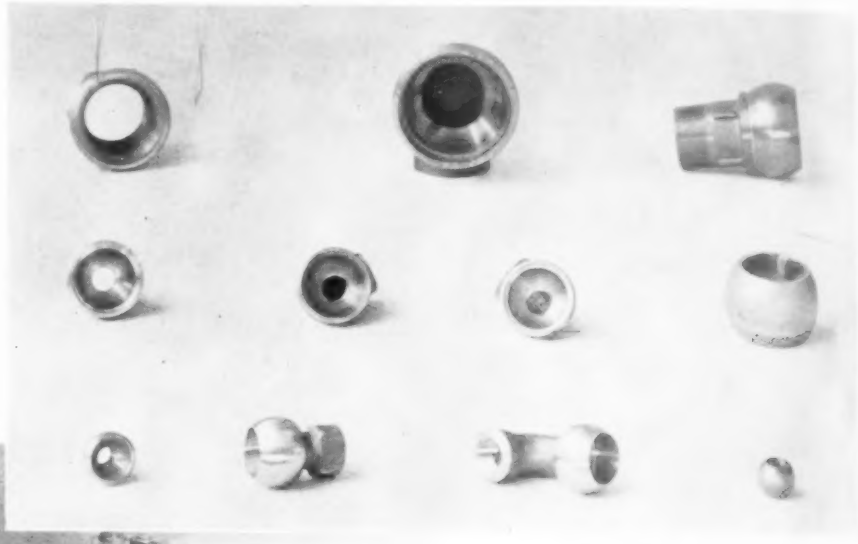
HAVE INGERSOLL ENGINEER YOUR CARBIDE CUTTERS
WRITE FOR INGERSOLL CUTTER CATALOG FULL OF DATA
ON THE DESIGN AND USE OF INSERTED BLADE CUTTERS

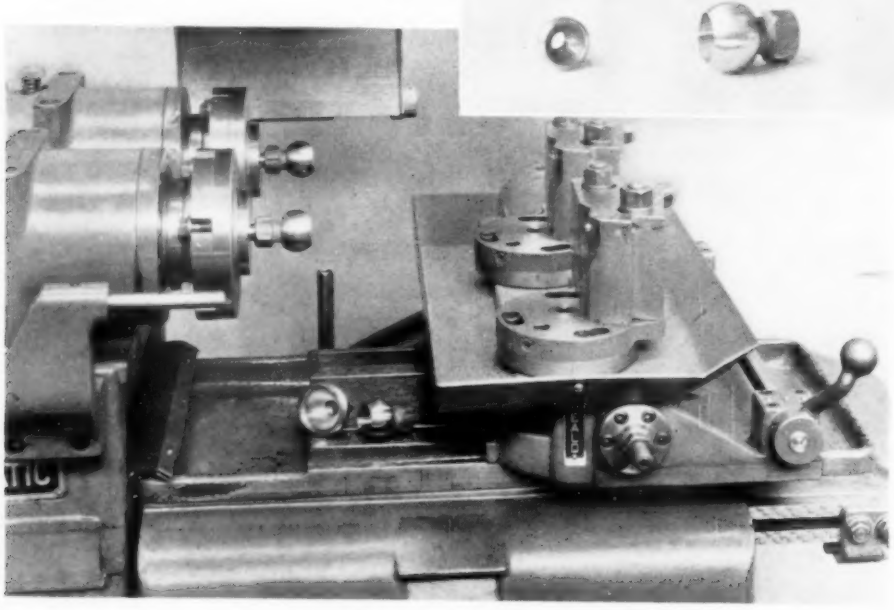
THE INGERSOLL MILLING MACHINE COMPANY, ROCKFORD, ILLINOIS

THIS MONTH'S COVER

The picture on this month's cover illustrates a Heald No. 18A Precision Bore-Matic turning the spherical surface on ball fittings used in flexible pipe joints. Do not be misled by what appears to be sparks thrown up from the work, for these are brass chips caught in the air by a flashlight and give a good indication of how fast material is removed in the mass production of both pipe joint fittings and valve fittings. It is interesting to note that while this job is on a strictly production basis that exceptional accuracy and fine finish is obtained at much less cost than could be obtained with previous methods.

Rotating work fixtures are used for holding and locating the balls and sockets. These consist of screw type adapter plates attached to the flanges of the two boring heads which are mounted on the bridge. By using suitable adapter plates, either a ball and the mating socket may





borized simultaneously for balanced production or two like parts may be finished at once for high production on one part alone.

The boring and turning tools are mounted in a two-station tool fixture attached to the machine table. A tool block on a rotating vertical head at each station of the fixture carries both a turning tool and a boring tool. Each head is mounted on precision type bearings and has a rotary movement about its axis obtained by action of a pinion on the toolhead shaft meshing with a rack which is actuated by a hydraulic cylinder at the rear of the fixture. The degree of rotation of the tool heads is controlled by an adjustable positive stop for the rack. The radius of the spherical surfaces to be either turned or bored can also be varied by adjusting the tool blocks on the tool head.

The cycle of operations for the straight ball fittings shown below is as follows: After screwing two ball fittings to the adapter plates the operator throws the reverse lever over and the table moves forward at rapid traverse. As the tools approach the work the boring heads automatically start rotating and when the center line of the work is directly over the axis of rotation of the tool heads, the table strikes a positive stop and comes to rest. The operator then throws over the fixture lever, causing the fixture hydraulic mechanism to rotate the tool heads and rough turn the spherical surfaces of the two ball fittings. At the end of the roughing stroke the operator reverses the fixture lever, causing the tools to swing through a reverse rack and finish turn the balls. This completed, the operator throws over the table reverse lever and the table withdraws to rest position for unloading.

Willys-Overland Back in Production

Toledo, Ohio.—Orders for materials amounting to approximately $21,000,000 will be placed during the coming year by Willys-Overland Motors Inc., it was announced Sept. 23 by David R. Wilson, president of the new company.

Of this amount, a substantial part will be spent for parts and factory equipment supplied by 106 Toledo firms, Mr. Wilson stated.

Factories and supply houses which will share in the material orders are located in many cities, including Detroit, Cleveland, Salem, Ohio, Pontiac and Monroe, Mich., Buffalo, N. Y., and Springfield, Ohio.

ENGINEERED PRODUCTION

EXAMPLES FROM THE SUNDSTRAND FILES

No. 3626

Lathes
Milling Machines
Tool Grinders
Centering Machines
Balancing Tools

Hydraulic Rigidmil Speeds Up Production of Cylinder Heads

Milling six spark plug seats simultaneously on an angular surface of cylinder heads shown in Fig. 1 is the work performed by the No. 25 Hydraulic Rigidmil shown in Fig. 2. Maximum production is secured by mounting two quick-acting fixtures on opposite ends of the Rigidmil table as shown in Fig. 3. The automatic two-way cycle includes rapid approach, feed to positive stop for accurate control of cut-length in close quarters, reverse, rapid approach to opposite fixture, feed, and so on continuously. Operator changes work pieces in one fixture while milling progresses at the other. Machine is accurate, fast, simple, compact, reliable, durable. Hydraulic equipment, Sundstrand designed and built throughout, provides exclusive operating advantages.

This machine is a typical example of the manner in which Sundstrand Engineered Production is increasing production and cutting costs on a wide variety of milling and turning operations. Capital investment is relatively low, and well protected against obsolescence. Investigate. Send drawings and data for reliable Engineered Production estimates on your milling and turning.

SUNDSTRAND MACHINE TOOL CO.
2532 Eleventh Street, ROCKFORD, ILLINOIS, U. S. A.

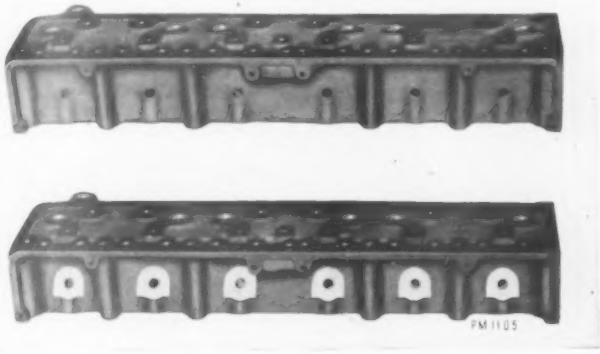


Fig. 1 — Cast iron cylinder head (above), with six spark plug seats Rigidmiled (below).

Fig. 3 — Two quick-acting fixtures, and Sundstrand automatic hydraulic cycle, provide maximum production.

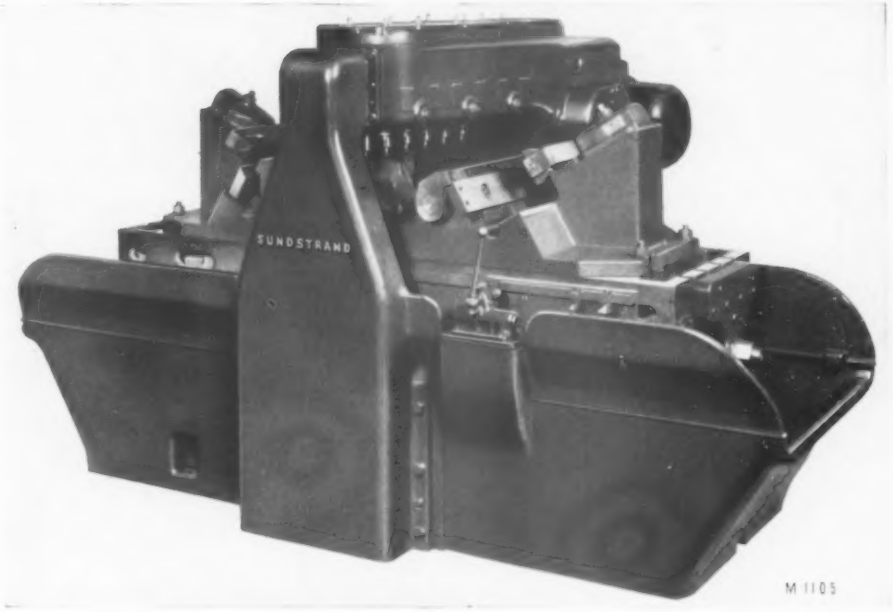


Fig. 2 — Sundstrand No. 25 Six-spindle Hydraulic Rigidmil for spark plug seats.

RIGIDMILS - STUB LATHES
3-Wheel Tool Grinders - Centering Machines
Hydraulic Operating Equipment - Special Machinery

WROUGHT WASHER FIRM OFFERS NEW SLIDE RULE

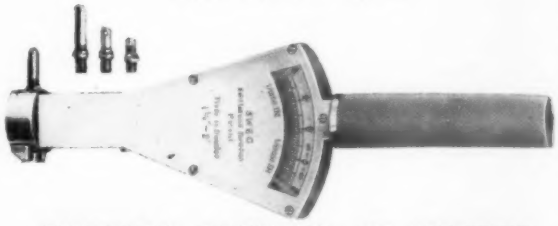
A new time-saving slide rule has just been developed by the Wrought Washer Mfg. Co. of Milwaukee, Wisconsin, manufacturers of Washers, Expansion Plugs, and Stampings.

This new slide rule automatically calculates weight per thousand pieces or pieces per pound of any size washer in any material including steel, brass, copper, aluminum, fibre, paper, etc.

This handy slide rule will be mailed free of charge to responsible firms making request on their company letterheads—or addressing *The Tool Engineer*.

Athol, Mass.—Henry L. Briggs, retired foreman, Union Twist Drill Co., and his wife recently celebrated their 55th wedding anniversary.

ONE NUMBER FIVE
SWEDISH INTERNAL INDICATOR
MEASURES ANY BORE SIZE
From 3" to 6" Diameter
QUICKLY AND EASILY SET
Direct from
JOHANSSON GAGE BLOCKS
thus replacing hundreds of plug gages.
OTHER SIZES FOR SMALLER BORES HAVE PROPORTIONATELY WIDE RANGES.
Scale Graduated to 0".0001
Variations of 0".00005
Easily Read
IDEAL FOR TOOL ROOM OR PRODUCTION LINE.



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ALSO EXCLUSIVE DISTRIBUTORS FOR
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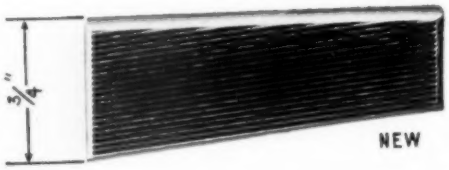
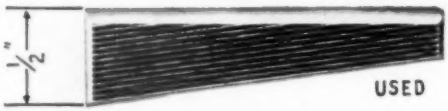
What about the "More Abundant Life" —
are your reamers making their contribution?
——— Here's what is available in ———





Inserted reamer blades
No. K7 Actual size

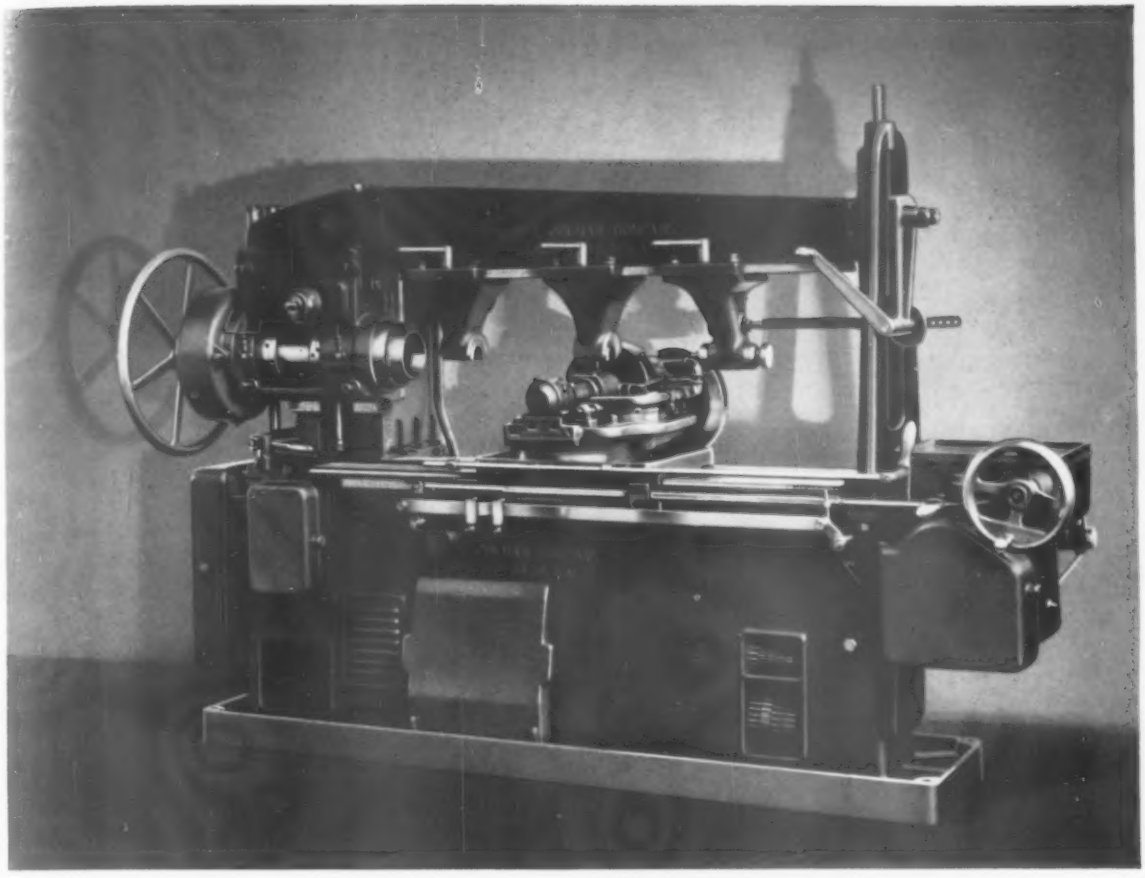
GD & GD
CAM
LOCK
REAMERS

Note that the length has not changed, all the stock removed from the used blade was utilized to replenish the diameter for resharpening, and adjustments can be as small as desired (no portion has been ground away because of excessive overhang).

Life in abundance and where you want it.

THINK IT OVER

GODDARD & GODDARD CO., Detroit, Mich.



For Spline Shafts – Use the Long Bed Barber-Colman Type A Hobbing Machine

Our standard length Type A Hobbing Machine maintains unusually high accuracy and provides high production at low cost on all hobbing up to 12″ diameter by 12″ face. These advantages can be obtained for extra long work, spline shafts and the like, by ordering the Type A with long bed illustrated above. This machine has 36″ of hob travel. The outboard end of the overarm is raised and lowered by an auxiliary screw which rotates simultaneously with movement of the work slide. Extra supports on the overarm, and any of the Type A accessories, can be supplied to order.

Executives interested in cutting costs and increasing production on highly accurate hobbing are invited to send for the two bulletins which describe the features and advantages of Barber-Colman Type A Hobbing Machines and their accessories.

BARBER B-C COLMAN

PRODUCTS

MILLING CUTTERS, HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, SPECIAL TOOLS

BARBER-COLMAN COMPANY

General Offices and Plant ROCKFORD, ILLINOIS, U. S. A.

4-WAY HAND CONTROL
MODEL "4090"

4-WAY CAM OPERATED
MODEL "6090"

"LOGAN"
HYDRAULIC CONTROL
VALVES

BALANCED PISTON TYPE
FOR
WATER OR OIL SERVICE.

DESIGNS AND MODELS
TO MEET
ALL CONDITIONS.

4-WAY FOOT CONTROL
MODEL "7010"

4-WAY SOLENOID OPERATED
MODEL "7000"

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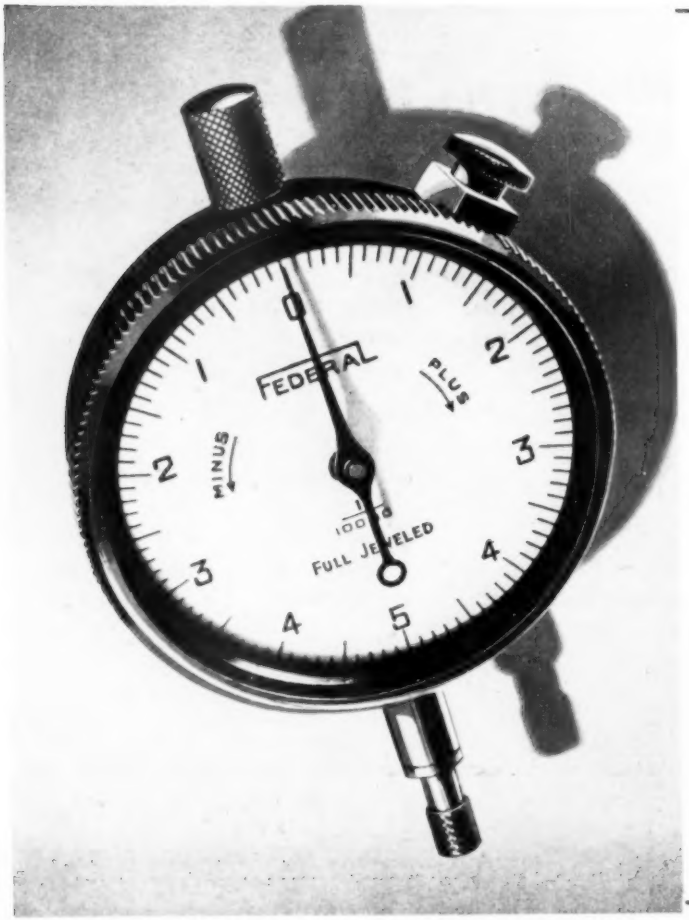

It's NEW—
this LOW-FRICTION
INDICATOR

Extremely light and free in action. Only a few grams pressure. The point follows every variation dependably and repeats it on the dial. It is exceptionally accurate and durable. Its value is already proved in actual use.

Send for Bulletin LF

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PRODUCTS CORPORATION

1144 Eddy St. Providence, R. I.
Chicago - Muncie - Detroit - Cleveland - New York

Otto Winters Goes to Toledo

Mr. Otto Winters, Chairman of Detroit Chapter, A.S.T.E., and for the past several years Manager of the Special Cutter and Tool Division of Whitman & Barnes, Detroit, has connected with the Kent Owens Special Machinery Co. of Toledo as Industrial Engineer.

One of our younger engineers, but quite seasoned, Mr. Winters has shown adequate qualities of leadership; he is progressive, intelligent and keenly analytical. We congratulate both him and his new employers on the connection.

New Officers Announced

William F. Wise has been appointed President of the Republic Products Corporation, 441 York St., Detroit, Michigan. Mr. Wise has, for the past nine years, been General Sales Manager of Ex-Cell-O Aircraft & Tool Corporation of Detroit.

R. B. Criddle has been appointed Secretary-Treaseurer of the same company. Mr. Criddle has been Sales Manager of the Machinery Division of Ex-Cell-O Aircraft & Tool Corporation of Detroit.

L. W. Howe Joins Lincoln Park Tool

Larry Howe, formerly Chief Tool Designer and Assistant Master Mechanic of the Kelvinator Corporation, Detroit, has resigned to become Sales and Service Engineer with the Lincoln Park Tool & Gage Company, of Lincoln Park, Michigan.

Mr. Howe comes to the latter company with more than twenty years practical experience in various phases of mass manufacturing—including tool and production engineering. The Lincoln Park Tool & Gage Company also announces an addition to their present plant facilities. The move is the result of an increasing volume of the company's business in the manufacture of precision tools and gages.

Dan Eyster, Milwaukee Secretary Resigns

Mr. Dan Eyster, Secretary of the Milwaukee Chapter, has resigned to take up duties with the Taylor - Winfield Company of Warren, Ohio. Mr. Julius A. Reidl of the Seaman Body Corporation, Milwaukee, Wisconsin, will be the new secretary of the Milwaukee Chapter.

Al. Witteman Joins Leland-Gifford Company

Mr. Al. Witteman, Assistant Chairman of the Milwaukee Chapter, has resigned to become a District Sales Manager for the Leland Gifford Company, and will be located at Cleveland, Ohio.

THE NEW LANDIS CAM GRINDER

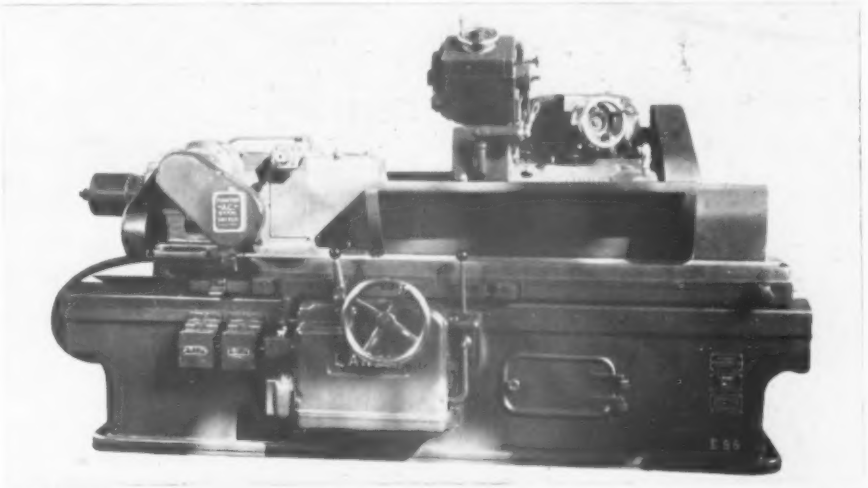
AS FAR AHEAD AS THE NEW CARS IT HELPS MANUFACTURE

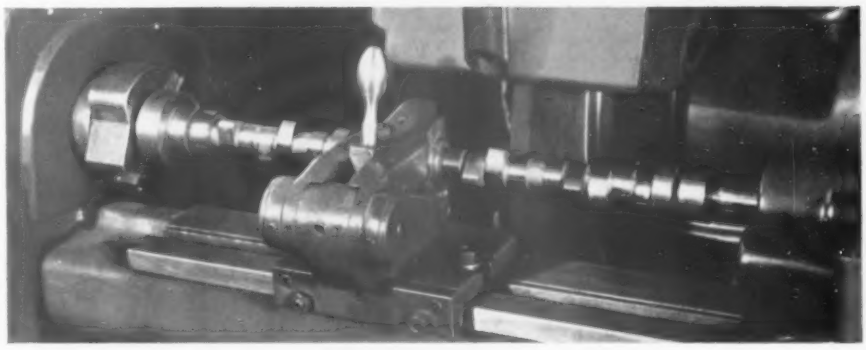
To say that the new Landis 5" Type D Hydraulic Cam Grinder is as far ahead as the new cars it helps manufacture is making a broad assertion. The facts justify this statement.

Many features of design contribute. Important among these are: the use of hydraulic power, weight and rigidity properly placed, automatic work rotation slowed down at the end of the cut on each cam and the proper synchronization of the many automatic hydraulic movements.

Based on the performance of so many successful Landis Hydraulic Cam Grinder installations, over a long period of time, numerous manufacturers are already installing the new 5" Type D machines. They have been quick to realize that from the standpoint of accuracy, finish and production, the new Type D will mean even greater operating economy and greater satisfaction than they have ever had before.

LANDIS TOOL COMPANY, WAYNESBORO, PA.





Ex-Cell-O Appoints California Representative

"Ex-Cell-O Aircraft & Tool Corporation of Detroit, Michigan, announces the appointment of the Herberts Machinery Company, Ltd., 2929 Santa Fe Avenue, Los Angeles, California, as their exclusive machinery sales representatives in Southern California. They will be selling products of the Machinery Division of Ex-Cell-O which include Junior and Senior Precision Boring Machines, Precision Thread Grinders, Multiple Drilling Equipment, Cemented Carbide Tool Grinders, Hydraulic Power Units, Special Machinery, Jigs and Fixtures."

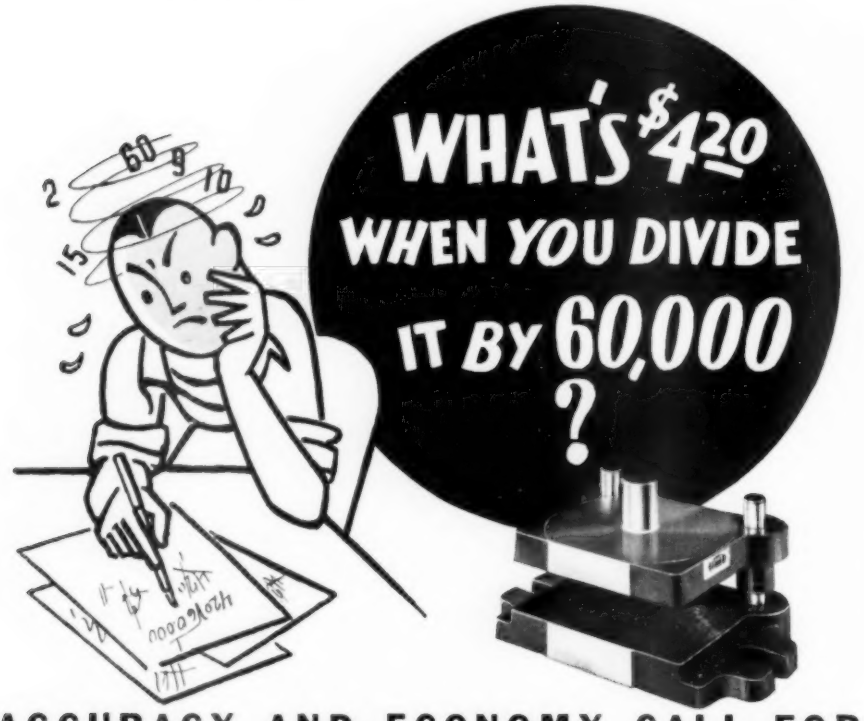
Ellingham, Prominent Works Manager Dies

Springfield, Mass.—Robert W. Ellingham, prominent for many years in the industrial life of the city and in a position of great responsibility during the World War died recently in Mercy Hospital after a brief illness.

At the time of his death he was with the Stevens-Walden Machine Company in Worcester. He assisted in the early stages of the organization of the Indian Motorcycle Company and was works manager at the plant during the period of great activity there.

During the World War he was called to Bridgeport, Conn., by Maj. Charles R. Penfield to have the management of the great plant of the Remington Arms Company which was at that time operating at top speed night and day turning out weapons for use in the war.

After the war he was in charge of the Van Norman Machine Tool Company plant in this city. He was regarded as expert in everything pertaining to the management of large industrial plants.



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DANLY DIE MAKERS' SUPPLIES

DETROIT CHAPTER ANNUAL STAG OCTOBER 30TH

This is the affair that Detroit A.S.T.E.ers have been waiting for — the ever popular Annual Stag Party which has always gone over with such approval.

Definite plans cannot here be announced, at time of publication, but it is expected that the location will be at the Amaranth Hall, Gratiot at McDougall Avenues in Detroit and the date is October 30th. All Detroit A.S.T.E.ers will be notified by mail regarding details, but keep this date open as the usual "big time" will be had by those who attend. There will be the usual features — including refreshments, etc. Plan now to attend.

I. A. A. in St. Louis, November 18, 19 and 20, 1936

Tool Engineers are invited to attend the meeting of the International Acetylene Association in St. Louis on the above dates at the Hotel Jefferson. This is the 37th annual convention. "Metallurgical Joints in Repetitive Production" . . . "Designs for Welding Which Will Defer Obsolescence" . . . "Equipping for Welding and Cutting" are among topics to be discussed in the first day's sessions.

TOOL AND FIXTURE DESIGN

Continued from page 15.

electric hydraulically - operated machine. On this type of installation the solenoid-operated hydraulic valve is used. It controls the different functions of the machine through limit switches and a rotary electrical indexing switch. The limit switch operates the indexing switch which in turn operates the solenoid hydraulic valve. The electrical equipment interlocks so that each function of the cycle of the machine must be completed before the switch will index for the next operation. This type of arrangement is foolproof, if any part should fail the machine will stop automatically and cannot go to the next operation of the cycle until the trouble is found and repaired.

I am familiar with a machine of this type that has just been finished for one of the automobile manufacturers where there are 15 operations to complete the cycle of the machine. All that is required of the operator is to push the starting switch and the machine will go through its 15 different operations automatically in 18 seconds.

When should semi-special, special or improved equipment be purchased? A manufacturer cannot afford to delay purchasing this equipment if it will pay for itself within the year. In figuring the saving you should take into consideration the man-power saved, the amount it would cost to keep your present machines in repair and the saving in tools over the old method. I have seen cases where the saving in tools alone would easily justify the purchase of new equipment.

There are instances where only the quality of production is taken into consideration when a machine is purchased, but sometimes a saving is shown in the following operation.

Take the case of precision boring Cylinder Blocks. These machines were bought for producing a precision bore, but after the machines were in operation a tool saving of 5c per block over the old method was made and the saving did not stop here, it reduced the honing operation to a minimum, produced a bore that was round and straight and it eliminated the number of different sizes of pistons and less trouble in the final assembly.

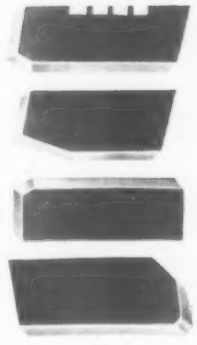
Precision boring will show a saving over any of the old methods. Hundreds of cases where new equipment not only shows a saving in labor, a tool saving, but where a superior product has been produced could be described if time permitted.

New Tool Company Formed

Thomas Manufacturing Company, is a new company formed to manufacture tools, dies and stampings for factories. Thomas A. Tischler, the sole proprietor of the company, has been engaged in tool and die manufacture for the past sixteen years. He was formerly with the Acme Die Works. The new company is located at 231 East Forest Avenue.

"CROBALT"

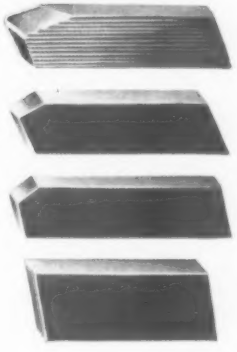
CROBALT is not experimental. Developed and applied experimentally in production as early as 1924, it has during the past two years been manufactured and sold commercially in Detroit and has successfully proven itself in large scale production in a wide variety of applications.



CROBALT is available in the form of both standard and special tools. Its low cost permits the use of solid tools instead of costly tipped types, particularly in the smaller sizes. For forming, CROBALT's high production per grind makes it an ideal cutting metal.

TURNING and FORMING

For such operations as turning, facing, and forming, etc., CROBALT possesses the definite proven advantage of longer tool life per grind—UNAFFECTED by the increased cutting speeds permissible with CROBALT.



STRADDLE and FACE MILLING

CROBALT's proven 20 per cent longer life (average) per grind as compared with competitive cutting metals has created for it a real place in the milling cutter field.

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TULSA, OKLA.—Brammer Mach. & Tool Service

LETTERS

(Continued from page 17.)

As you see in the enclosed photo, I used a 13" single Disc W. C. Lipe Clutch (a type used in our trucks) which I picked up in our Salvage Department and the Ring Gears and pinions from a rear axle for adjusting screws. The 13" Disc I used for both clutch and brake and the clutch spinning 1800 R.P.M. seems to supply very nicely the necessary torque for operating the Press.

This machine made from angle iron and boiler plate operates very satisfactory and in both of the above cases the cost is approximately one third of what would have been spent for standard machinery.

In my opinion, with cutting torches and arc welders, it seems unlimited and very much justified for small production plants to build machines to fit their particular problems, in their own Tool rooms.

Hoping this article may be of interest to the readers of *The Tool Engineer* and to many small users of sheet metal equipment, I am,

Very truly yours,

(Signed) Hans H. Stangaard.

Well, here we have both a comment and a shop kink. The article referred to, however, was academic, nor can any hard and fast rule apply. Necessity is the mother of invention, and when the boss turns thumbs down on new equipment it is often up to the production men to improvise. "Produce the goods."—*Editor.*

HANDY ANDY'S WORKSHOP

(Continued from page 16.)

One of the boys, H. Mitschke, reports himself "Way Down East" with Pratt & Whitney in Hartford. Interesting chap this Mr. M. Among other things he is an Esperantoist.

'S'all. I'll be seeing you.

H.A.

ICE MANUFACTURING ON WHEELS

Milwaukee, Wisconsin — An ice manufacturing plant on wheels rolled out of the Vilter Manufacturing Co. plant in Milwaukee Sept. 21—the first of its kind produced in this country.

Sold to Snow Ice Inc., Chicago, who eventually plan to operate a fleet, the unit was designed by Vilter engineers to fit in a remodeled railroad box car.

The plant will be used to supply ice to vegetable shippers who use large quantities for refrigeration purposes. Vilter officials explain that as the shipping season is generally only from one to three months long in each locality, shippers can't afford to own their own ice manufacturing plants. Hauling ice to their shipping center is also expensive.

As a result Snow Ice, Inc., will rent out the new unit to furnish ice. It will be spotted at a shipping center where it will produce ice during the shipping season and then it will be moved north for the next shipping season, in that way utilizing its service 12 months a year.

The Vilter product, powered by an eight cylinder Diesel engine, can turn out 30 tons of ice, or 60,000 lbs. a day. About 15,000 lbs. are needed to ice one car of vegetables. In stressing the engineering accomplishments on the new unit, it was pointed out that an ordinary cake ice manufacturing plant with like capacity would need a building 25 by 45 feet.

NEW EQUIPMENT

(Continued from page 17.)

head from sliding excessively when used on an inclined board—an exclusive feature, it is said. Other features of the new type drafting machine are: adjustable skid buttons for levelling scales, fully enclosed pulleys, New Departure, precision, fully enclosed ball bearings, an elbow leveling device, and a dull-finish aluminum or baked enamel, entirely eliminating friction. According to the manufacturer the new Bruning Drafting machines have the fewest number of working parts of any drafting machine heretofore offered.

* * *

Lincoln Electric Company, Cleveland, Ohio. New Continuous Dual Arc Control Welder—"Shield Arc SAE". The predominating feature of this new arc welder is the new method of arc control which makes possible, it is claimed, the adjustment of both arc heat and arc penetration in a continuous sequence of fine increments. It is also claimed this continuous dual control assures absolute uniformity of performance. At every control setting it adds greatly to the successful operation of arc welding.

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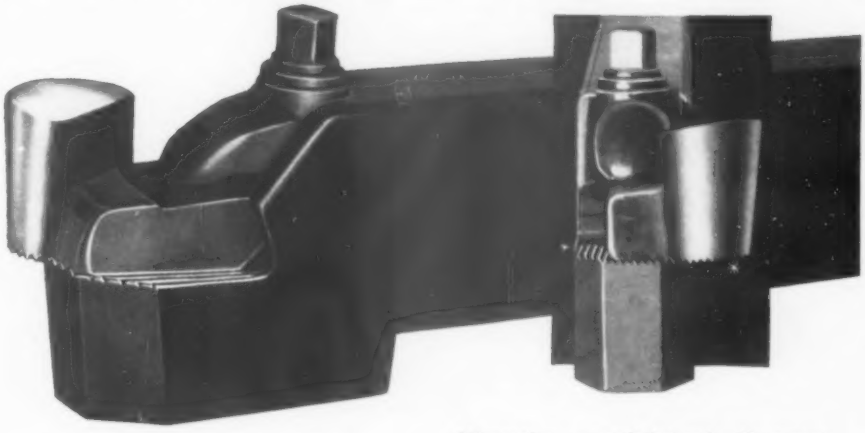
IS ALSO OBTAINABLE IN SINGLE POINT TOOLS

THE locking clamp locks the tool bit rearwardly against the slanting shoulder, or angular mating surface, and downwardly into the bottom angular serrated mating surface in the holder. This prevents sidewise or lengthwise tipping of the tool bit without throwing the strain on the locking clamp; at the same time, the mating serrations permit free lateral adjustment.

O. K. Tool Bits are made of the best high speed steel, drop forged, and correctly heat treated for cutting purposes. The holders are of chrome nickel alloy, drop forged, and specially heat treated for toughness. Thus, you invest in the higher priced stock only where needed, ***in the bit***, not in the entire tool.



*Serrations permit lateral adjustments

If you have a cutting problem and will describe it, we will take steps to assist you in arriving at an effectve solution.

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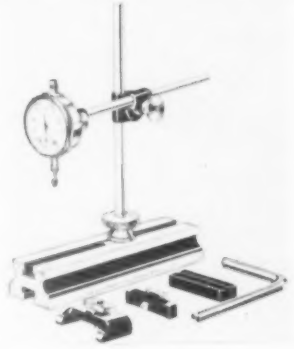
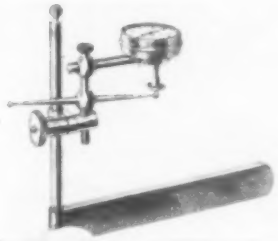


Dial Test Indicator No. 665

For general machining, toolmaking, and inspecting work.



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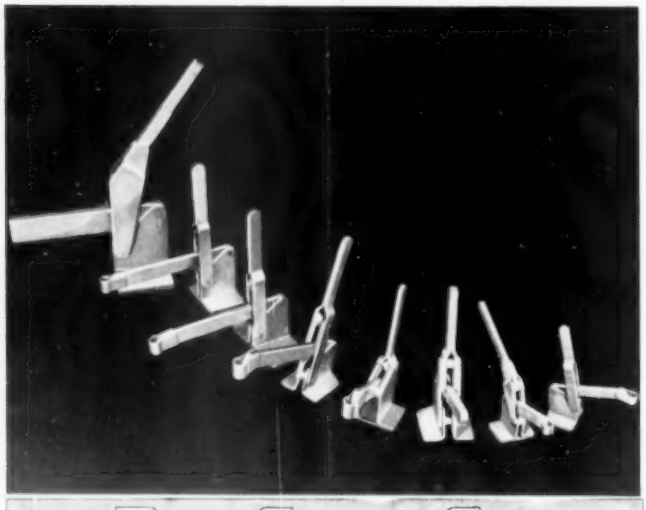

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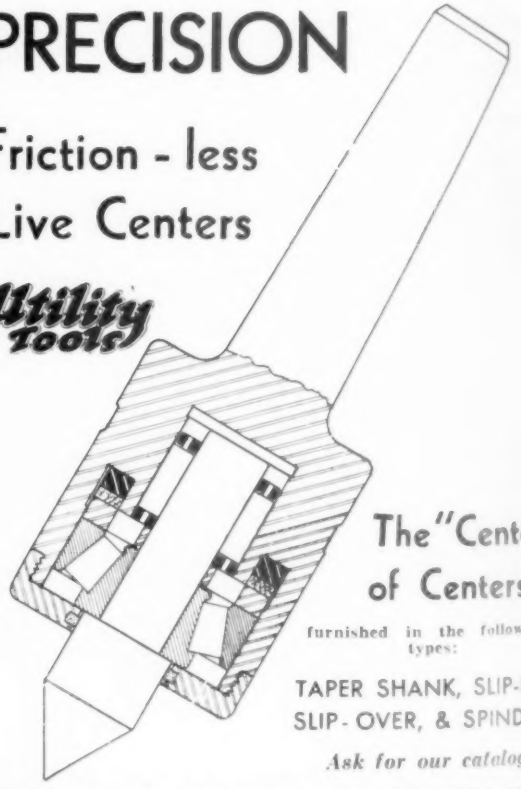

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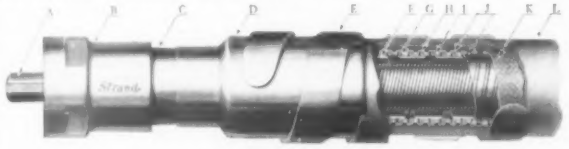

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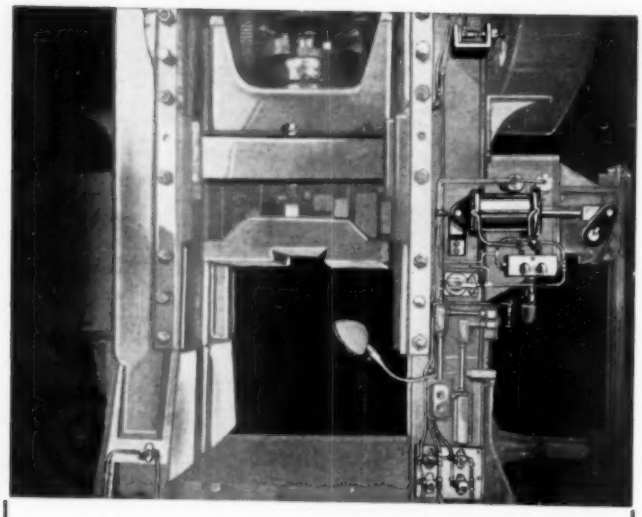

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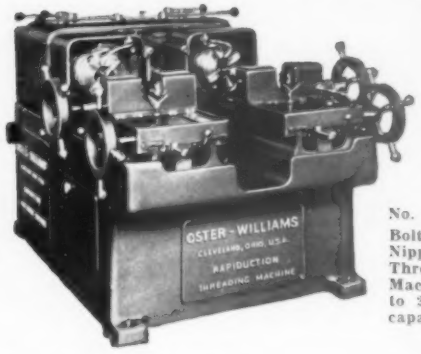

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With this high-speed performer on the job you will set new production records. Extra heavy construction assures accurate vibrationless operation at all eight spindle speeds from 32 to 196 R.P.M. and on all types of threading work. Also furnished in single spindle type. Write for descriptive folder.

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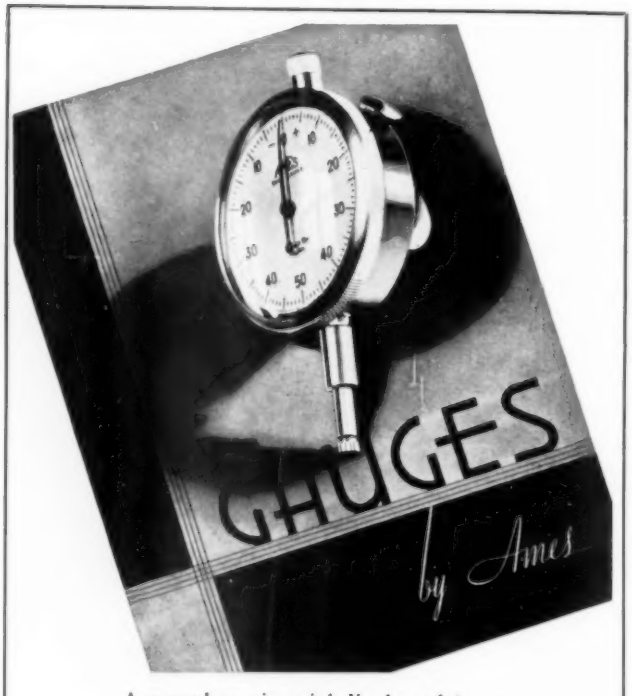

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ADVERTISERS' INDEX

Ames, B. C. Company	38
Barber Colman Company	29
Brown & Sharpe Mfg. Company	Third Cover
Bullard Company, The	20
Chicago Gear Works	34
Chicago Wheel & Mfg. Co.	37
Cleveland Twist Drill Co.	Second Cover
Danly Machine Specialties, Inc.	32
Detroit Broach Company	37
Detroit Stamping Company	36
Eclipse Counterbore Company	23
Ex-Cell-O Aircraft & Tool Corp.	Fourth Cover
Federal Products Corp.	30
Firth-Sterling Steel Company	4
Gairing Tool Company	36
Glenzer, J. C. Company	36
Goddard & Goddard Company	28
Hanna Engineering Works	3
Hannifin Manufacturing Company	8
Haynes Stellite Company	5
Heald Machine Company, The	19
Ingersoll Milling Machine Company, The	25
Landis Tool Company	31
Logansport Machine, Inc.	30
Meldrum Gabrielson Corp.	36
Michigan Tool Company	33
Morse Twist Drill Company	6
National Automatic Tool Company, The	21
O. K. Tool Company, The	35
Oster Manufacturing Company, The	38
Rivett Lathe & Grinder Inc.	24
Sheldon Machine Company	34
Standard Pressed Steel Company	37
Starrett, L. S. Company, The	35
Strand, N. A. Company	27
Sundstrand Machine Tool Company	27
Swedish Gage Company of America	28
Tomkins Johnson Company, The	38
Union Carbide & Carbon Corp.	4
Universal Engineering Company	34-38

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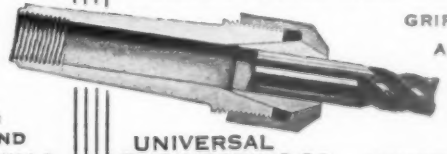

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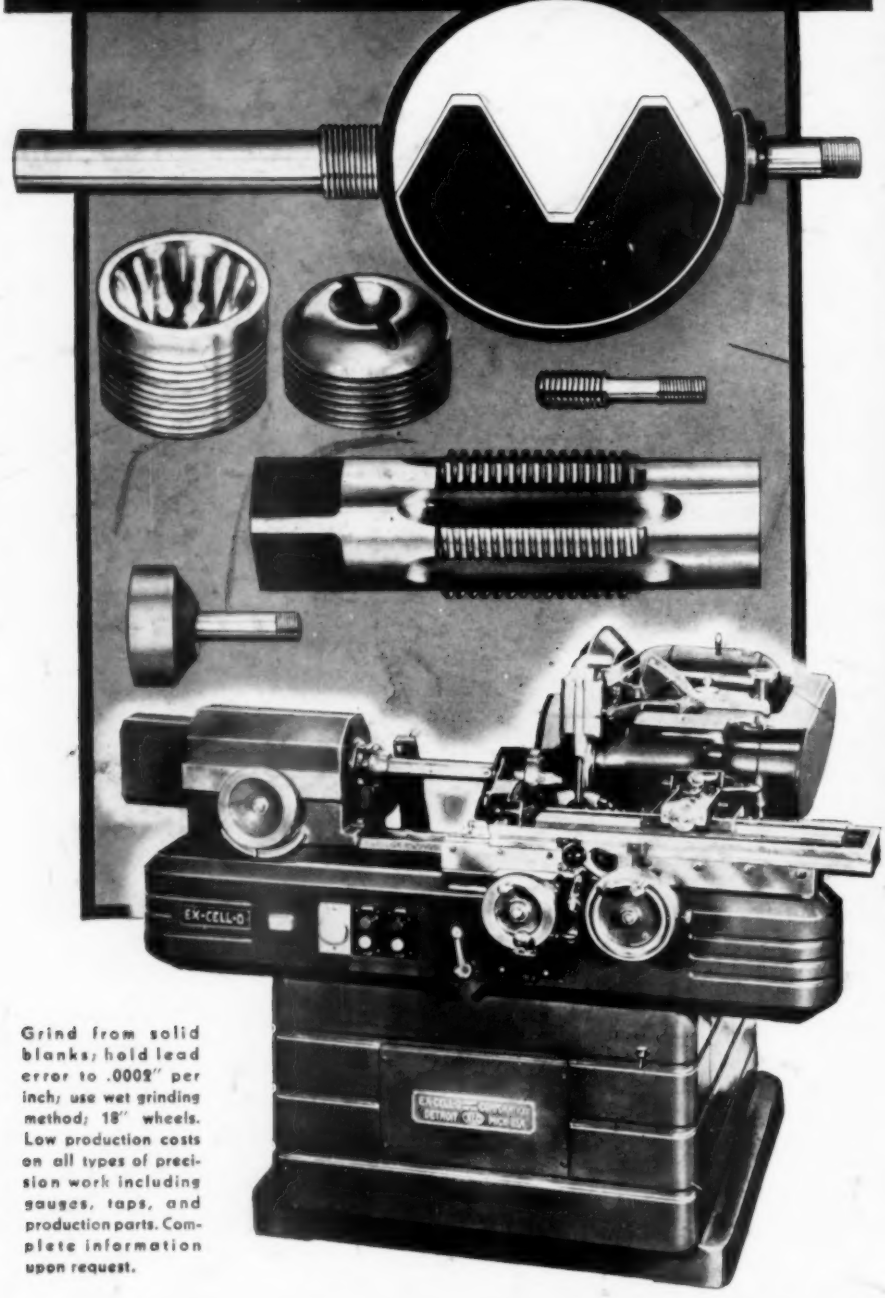
PRECISION THREAD GRINDERS
Produce Accurate Threads At Low Cost



Grind from solid blanks; hold lead error to .0002" per inch; use wet grinding method; 18" wheels. Low production costs on all types of precision work including gauges, taps, and production parts. Complete information upon request.

COUPON

Please send me descriptive literature on XLO products as indicated below:

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

Name

Position

Company

City and State

EX-CELL-O
AIRCRAFT & TOOL CORPORATION DETROIT, MICHIGAN